HOUSEHOLD CONSUMPTION, NET WORTH, AND THE MACROECONOMICS OF ASSET PRICE INFLATION

by

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A dissertation submitted to the faculty of
The University of Utah
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Department of Economics

The University of Utah

December 2015

The University of Utah Graduate School

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ABSTRACT

The objective of this dissertation is to make a contribution to our understanding of the influence of asset prices and their fluctuation on U.S. macroeconomic conditions. It will be argued that asset prices, by their very nature forward-looking economic variables, both influence and are influenced by the real sector. The view put forth here is in contrast to the standard narratives of rational agent behavior and efficient pricing of financial assets. Under the assumptions of both theoretic paradigms, asset prices respond passively to the issuing firm's fundamentals and expected future profits. Asset mispricing, i.e., price divergent from fundamentals, was thought to be insignificant, as it was widely believed that destabilizing speculation would be unprofitable.

If price change were acknowledged, the connection between the two was thought to be through 'wealth effects' caused by asset price gains, 'exogenous shocks,' or the 'financial accelerator.' This dissertation highlights three gaps created from standard or predominant views where asset price inflation and financial sentiment have a merely moderate influence. Chapter 2 seeks to address the question of how consumption could remain robust in the face of stagnant wages, and discusses the possible explanatory power of the wealth effect and the rise in private credit in providing an answer. In addition, the chapter shows that the link between consumer spending and asset prices is more closely aligned than that of net worth and spending following 1996.

Chapter 3 addresses the question of how U.S. households' access to credit could

increase at a time of falling savings. It looks at the components of net worth and net flows of saving and asset revaluation as well as their effect on the supply of domestic credit. It finds a multidirectional link between credit and asset price growth based upon the following: (a) asset price growth has been the primary factor of household net worth, (b) credit growth has been a key determinant of asset price change, and (c) the expansion of credit has Granger-caused capital gains after the mid-1990s.

Chapter 4 provides an alternative explanation of how asset prices influence the real economy. The explanation clarifies the trends and questions highlighted in Chapters 2 and 3. In addition to showing three direct channels of effect and empirical findings, the chapter highlights the influence of financial sentiment on asset values. The change in market sentiment causes disparate effects on the assets and liabilities of a firm's balance sheet. I show that a potential discrepancy arises on the asset side when the expected profitability of the borrowing firm changes at a rate greater (or less) than the initial value of the issued security, which acts as a liability for the firm.

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ACKNOWLEDGEMENTS

I am incredibly grateful to the many people who contributed to this work and my graduate studies at the University of Utah. I would like to thank my chair, Korkut Alp Ertürk, for his guidance, input, support, and motivation throughout this process. I am also grateful for the feedback and instruction I received from Codrina Rada and Richard Fowles, both in your classes and offices. Thank you to Jim Gander and Philip Arestis for your invaluable critiques and guiding suggestions.

Discussions at various stages with Iris, Jason, Ahmad, Jason, Jean, Steve, and Christine were invaluable. I am also thankful for inspiring and helpful influences of Dick Chapman, John Watkins, Michael Mamo, Becky Guillory, and Tom Maloney. The feedback I have received in presenting pieces of this work at the Western Social Sciences Association, Western States Graduate Workshop, and to the faculty of CSU-Chico also helped to shape this work. I can claim only partial credit for the contributions of this dissertation; the shortcomings are my own.

A great deal is owed to those who supported and kept me sane throughout this task. I am incredibly grateful to my parents and siblings who motivated graduate work and encouraged me each step of the way. Thanks to those who helped me get outside after long days in the library. Finally, I owe my biggest thanks to Jess and Sam whose patience, love, and support were of more value to me than they know.

CHAPTER 1

HOUSEHOLD CONSUMPTION, NET WORTH, AND THE MACROECONOMICS OF ASSET PRICE INFLATION

The objective of this dissertation is to make a contribution to our understanding of the influence of asset prices and their fluctuation on U.S. macroeconomic conditions. The monetary economy is driven by future expectations and financial sentiment, whereas the real economy relates to the actual production of goods and services. Until the Great Recession, the predominant view was that asset price inflation and financial sentiment had only a moderate influence on the real sector. The connection between the two was thought to be through 'wealth effects' (Bernanke, 2007; Mehra, 2001) caused by asset price gains, 'exogenous shocks,' or the 'financial accelerator' (Bernanke, Gertler, & Gilchrist, 1999).

It will be argued in this dissertation that asset prices, by their very nature forward-looking economic variables, both influence and are influenced by macroeconomic events. Expected future profits of the issuer of financial assets are clearly responsive to real macrovariables such as labor market conditions, income, aggregate demand, and consumer confidence, all of which determine the initial value of the asset. The reverse causation has increasingly become important in the neoliberal era as well: as upward revaluation of financial assets has had significant influences upon macroeconomic

dynamics. Arguably, financial innovation, deregulation, and globalization have altered the former stable and passive relationship asset prices had with real economic variables.

The view put forth here is in contrast to the standard narratives of rational agent behavior and efficient pricing of financial assets (Fama, 1970). Under the assumptions of both theoretic paradigms, asset prices respond passively to the issuing firm's fundamentals and expected future profits. Asset mispricing, i.e., price divergent from fundamentals, was thought to be insignificant, as it was widely believed that destabilizing speculation would be unprofitable. Friedman (1953) championed this view, stating that asset price speculation could be stabilizing only if it were profitable. For instance, an overvalued asset would self-correct when 'smart traders' shorted the security, driving its price back into line with *fundamentals*. Though there were significant developments in finance that challenged this view, the Efficient Market Hypothesis is, even in the aftermath of the Financial Crisis, generally accepted within economic theory. The effect was to disregard and marginalize the potentially disruptive impact asset price bubbles could have on the real economy. At least implicitly, it is assumed that asset prices are always in alignment with the initial expected discounted value of the asset's payoff (Cochrane, 2009), and that speculation acts as a stabilizing force. In this framework, asset valuation and shifts in financial sentiment were deemed to have an insignificant effect on the macroeconomy.

Nonetheless, the nature of the economic performance and certain macroeconomic dynamics has brought into question the passive view of asset prices and the efficient market hypothesis. For instance, despite stagnant wage growth for middle-income groups, consumer spending had been robust, and declining household saving had no

constraining effect on household ability to borrow. In fact, both the credit supply and the household net wealth to income ratio have grown markedly. To explain these developments, some economists have stressed the importance of wealth effects caused by asset price revaluation. As many economists and commentators have recognized, one avenue by which asset price inflation influences macroeconomic variables is a sector's net worth, which subsequently impacts its access to credit (Mian & Sufi, 2014). In the case of financial intermediaries, asset price-driven net worth also motivates additional lending (Adrian & Shin, 2010).

However, the simple addition of a sector's net worth, a stock variable as an explanation for credit flows or spending, may miss the mark. One objective of this dissertation is to highlight the effect of asset price inflation on credit, independently of its impact on net worth. This is done by showing evidence in favor of the direct effect of asset price changes on consumer spending and examining the bilateral relation between credit and asset price inflation. Both relationships have grown stronger with the progressive stages of financial liberalization, specifically since the mid-1990s.

The dissertation is divided into the three following chapters: macroeconomic views of consumption (Chapter 2); asset prices, saving, and credit (Chapter 3); and asset price revaluation and the income-expenditure balance (Chapter 4).

Chapter 2 seeks to address how consumption remains robust in the face of stagnant wages and discusses the possible explanatory power of the wealth effect in providing an answer. It summarizes various theories of consumption, beginning with the contributions of Friedman (1957) and Modigliani (1963) and the less well-known views of Duesenberry (1949). The chapter then discusses the contemporary empirical literature

on the household 'wealth effect,' often based on the theories of rational spending behavior theorized by Friedman and Modigliani. The chapter finds that whereas forms of household wealth are significant in spending decisions, the impact of credit growth has been equally important. In addition, the chapter shows that the link between consumer spending and asset prices is more closely aligned than that of net worth and spending following 1996. The latter finding is important in that it demonstrates differing effects from net saving and asset inflation upon household wealth.

Chapter 3 addresses how U.S. households' access to credit could increase at a time of falling savings. It looks at the components of net worth in net flows of saving and asset revaluation as well as their effect on the supply of domestic credit. As shown in Chapter 2, increased wealth motivates and supplements income in spending, and many economists (e.g., Mehra, 2001; Mian & Sufi, 2009) have suggested that the increase in household net worth caused by rising asset values was the source of finance for households. Other economists view asset revaluation as an appendage to residual household saving (Gale & Sabelhaus, 1999; Poole, 2007)[1] based on the notion that if asset price growth is in line with the issuing companies' *fundamentals*, forward-looking agents holding the assets will view that growth as a part of their own future saving. The rise and change in household wealth from asset price inflation reveals an increase in a 'broader' form of saving (Guidolin & La Jeunesse, 2007). The drastic fall in the conventional household saving rate beginning in the early 1980s was viewed as an agent or sector's rational response to the expected rise in wealth from asset price growth.

[1] The Federal Reserve's Flow of Funds definition of personal saving is financial assets and tangible capital held by households and nonfinancial corporations minus proprietor's own equity. However, economists (e.g., Gale & Sabelhaus, 1999; Guidolin & La Jeunesse, 2007; Poole, 2007) add capital gains from financial and nonfinancial assets, suggesting that if these are included, then the fall in saving is not so drastic.

This new view of saving is problematic as it omits the direct and multidirectional influence of asset price shocks on credit and spending. It also ignores the potential for bubble dynamics and their short- and long-run macroeffects. Also, the multidirectional link between credit and asset price inflation, highlighted in Chapter 3, raises doubts about the validity of this view. The said link is based upon the following: (a) asset price growth has been the primary factor of household net worth, (b) credit growth has been a key determinant of asset price change, and (c) the expansion of credit has Granger-caused capital gains after the mid-1990s. With each progressive stage of financial liberalization, asset price inflation and the supply of credit become more tightly connected. During this period, real estate and stock prices now have a life of their own (Shiller, 2015).

Chapter 4 tries to provide an alternative explanation of how asset prices influence the real economy that can make explicable the trends and questions highlighted in Chapters 2 and 3. It first summarizes the three views economists generally use in explaining how asset price inflation impacts the income-expenditure balance: (a) the wealth effect, (b) a rise in firm net worth, and (c) growth in credit suppliers' net worth. It then provides an alternative framework that underscores the importance of financial sentiment with respect to asset values.

It is argued that the change in market sentiment causes disparate effects on the assets and liabilities of a firm's balance sheet. A potential discrepancy arises when the expected profitability of the borrowing firm changes, and the values on the asset and liability side consequently diverge. One way to see this is by including expected profits explicitly in firm balance sheets. An increase in expected profitability above that anticipated and thus greater than the initial value of the security creates a margin, raising

the net worth of either the issuer or purchaser of the asset. If the market price of the security rises in tandem with profit expectations, the gain accrues to the holder, to the issuing firm in the event the price change is less than the increase in profit expectations.

Coincidentally, the question of how the effects of financial sentiment can be captured in macroaccounting is identified as the key issue in the recent debate between Paul Krugman and Steve Keen over the treatment of private debt and the income-expenditure balance. Keen suggests that the growth of debt liabilities is a source of aggregate demand, which allows for both growth and a divergence in the macrobalance. His macroaccounting intuitively captures the manner in which expectations influence real economic variables through a sector's willingness to take on new debt. Krugman discounts the role of growing private debt, as "one person's debt is another person's asset" (Krugman, 2012, p. 43) and should be reflected as such in macroaccounting. *Ex post*, income equals expenditure.

Chapter 4 illustrates the potential divergence using simple balance sheets where a margin is created from optimistic expectation of return in excess of that during the initial security issue. Making expected profits explicit as an intangible asset in the firm balance sheet can show the margin or change from a turn in sentiment. At a more abstract level, these intangible assets represent the change in private debt Keen highlights.

In following Keynes, this dissertation attempts to illustrate some of the mechanisms by which views about the future affect output and labor outcomes. It emphasizes the increased role of asset prices in the monetary economy following both financial innovation and deregulation and their influence on credit and expenditure. In line with the *Treatise*, it aspires to add to, understand, and "discover the dynamical laws

governing the passage of a monetary system from one position of equilibrium to another" (Keynes, 1930, p. v).

CHAPTER 2

MACROECONOMIC THEORIES OF CONSUMPTION-
THE NET WORTH CREDIT LINK

2.1. Introduction

In the years leading up to the Great Recession, researchers found that U.S. household consumption had become increasingly dependent upon borrowing. Stagnant wage growth for all but the highest income quintile presented households the choice between reducing consumption and borrowing when income deteriorated. At the same time, asset prices, aggregate household wealth, international saving, and private debt all surged to new highs, fueling credit within the domestic economy. Growth in the size and scope of the U.S. credit market provided the means for aggregate consumption to continue its uptick, and private debt accumulation became the means by which expenditure could exceed income (Keen, 2013).

The question is whether these stylized facts can be explained by the traditional theories of consumption such as Friedman's permanent income hypothesis (PIH) as complemented with the wealth effect. Freidman's PIH and Modigliani's related life cycle income hypothesis (LCIH) posit that consumer spending varies with an expected or permanent level of future income. Variations in household consumption are thus expected to be smoother than short-term fluctuations in income, with spending exceeding income

in life's early and late phases and falling below it during peak or middle-life years. In the LCIH and PIH framework, debt is conceptualized as a means of consumption smoothing, so the lack of saving by midlife agents can appear as an anomaly.[2]

The increased importance of asset price inflation in U.S. households' ability to finance their expenditure goes beyond the simple wealth effect, because higher asset prices also increase the households' ability to access credit. Our results show that whereas asset prices had little influence on consumption prior to financial liberalization, their importance has grown since the 1990s, and during this latter period, the link between household consumption and net worth has not been as tight as the direct relation between consumption and asset prices. Net saving and capital gains are the primary drivers of household net worth. The former finding suggests a negative effect from net saving upon credit, which will be developed in Chapter 3.

The chapter is organized as follows: Section 2.2 provides a summary of the traditional theories of consumption and a discussion of how well they hold up in the era of financial liberalization. Section 2.3 discusses theories of consumption in connection with the wealth effect and wealth shocks, which regained currency with both the equity boom in the 1990s and the housing boom of the 2000s. Shortcomings of this approach in explaining rising private debt and aggregate consumption in the face of wage stagnation are discussed, and other critiques of the wealth effect are also considered. Section 2.5 provides alternative theories of consumption such as Duesenberry's relative income hypothesis and extensions from Post-Keynesians. It also adds Bernanke's financial

[2] Of course, the question needs explanation, i.e., steady consumption and falling savings are relevant for households except those in the top decile. In fact, although wages and incomes were stagnant during the stock boom of the 1990s and real estate boom of the 2000s, aggregate income and savings grew for those households on the top of the income distribution. So, unless otherwise indicated by *households,* the chapter refers to those in the bottom 90%.

accelerator. In Section 2.6, our theoretic framework and explanation of consumption behavior is set forth. Section 2.7 first reproduces recent research on consumption's response to wealth effects but then add the role of private debt in an additional vector autoregression. Section 2.8 depicts a tighter link over three observed periods between consumer spending and asset prices from consumption and net worth. Section 2.9 summarizes our extensions to the financial accelerator and the influence of asset price inflation upon consumption.

2.2. Life Cycle Income and Permanent Income Hypotheses

The life cycle income hypothesis (LCIH) and permanent income hypothesis (PIH) and related approaches to consumption emerge from the work of Milton Friedman (1957) and Franco Modigliani (1963). Friedman's PI hypothesis regarding consumption suggests that household spending depends not only on current but also on expected future and 'permanent' income. According to Modigliani, households rationally plan their saving and consumption over their lifetime. Both hypotheses have households maximizing lifetime utility through consumption smoothing and wealth accumulation on the basis of their long-term expected permanent income.

An emphasis on forecasted income implies that rather than responding to short-term fluctuations in income, consumption levels out over time. Households spend more than their income during the early and late phases of life while paying down debt and saving during their productive midlife. Temporary shocks have minor effects in comparison to events that alter expected permanent income. Within the model, young 'agents' are likely to be net borrowers while paying for school and housing. Saving and paying down debt occur during life's middle years in preparation for retirement when

households expect that their average future income will be less than current income. Dissaving begins in retirement and old age when expenditure exceeds current incomes.

Together, the LCI and PI hypotheses were based on a criticism of the traditional 'Keynesian' idea of tying consumption to current income on the margin. LCIH and PIH assert that consumption is based on lifetime or multiperiod expectations rather than short-period response to income as in Keynesian analysis, where the only important variable was disposable income. Short- and long-run consumption functions are added, with the latter exhibiting a larger marginal propensity. Friedman also critiqued the Keynesian assertion that consumption to income would diminish as income rose, citing Kuznet's (1952) study of the stable ratio since the 1860s. Permanent or life cycle expected income varies less than actual income, explaining why consumption's fluctuations were less than that of income. PIH asserts that the marginal propensity to consume will equal the average propensity to consume. Short-run Keynesian income fluctuations were of lesser importance.

LCI and PI also relaxed the reverse link Keynes postulated between consumption and income where an exogenous increase in the former gives rise to a multiplier effect on income. Clearly, the ripple effects on the economy from a onetime increase in expenditures would be insignificant if people expected government spending or tax reductions as temporary and adjusted their spending accordingly. Instead, they hedged against the time when policy would be reversed as in Barro's variation of Ricardian equivalence (Barro, 1988).

LCI adds a financial component to the consumer decision, by incorporating the intertemporal nature of wealth accumulation. Agents in their early years hold little

wealth, whereas life's midyears involve gradual paying off of debt and the acquisition of assets such that wealth peaks just before retirement. Finally, when dissaving begins in later years, wealth also begins to dissipate. Although it is constantly being shifted among different age groups, wealth grows in the aggregate with population and income. If income is also on the rise, the young's saving will be larger than the dissaving of the elderly, causing overall aggregate saving to increase (Deaton, 2005).

The economic intuition of the LCIH and PIH is appealing, and Kuznet's observations cemented the theories within economics. For an individual, consumption may be less volatile than current income from rational intertemporal planning of expenditure. Empirically, aggregate consumption also fluctuates less than disposable income, which is viewed as confirming the theory. However, LCIH and PIH are inadequate, in their explanation of rising consumption in the face of stagnant middle incomes. These hypotheses also fail to provide a satisfactory account of the buildup of debt and aggregate wealth in the neoliberal era.

2.3 Wealth Effects and Consumption

The wealth effect is often appended to the LCI/PI hypotheses, where accumulated wealth acts as another method to finance consumption for individual or aggregate consumption functions, although wealth has a smaller marginal spending reaction than that from changes in disposable income. Wealth effects can be either positive or negative, and result from an unexpected shift in household financial stance. Household wealth is held in financial and nonfinancial assets and accumulates over time mainly through flows

of net saving and asset price revaluation.[3] If disposable income fails to grow, consumption can continue so long as wealth remains.

Following Friedman and Modigliani's theoretical contributions to consumer theory, less focus was given to wealth shocks until the late 1990s. During that period, wealth to disposable income ratios had also been relatively stable since World War II. Asset price appreciation with the rise of the dot-com or tech stock boom of 1997-2000 led economists to reconsider equity wealth's effect on consumption (Dynan & Maki, 2001; Mehra, 2001). The essential question was how consumer spending would be affected by the marked increase in financial asset prices. Mehra's cointegration and error correction models showed the positive effect of equity wealth upon consumption from 1960 to 1999.

Likewise, Dynan and Maki found a positive relation from 1980 to 1999 between consumption and increased equity wealth. Both Mehra and Dynan and Maki presented larger reactions than that of the previous wealth effect literature: a dollar increase from equity wealth or capital gain is associated with a 3-5 cent increase in consumption spending. Both short- and long-run wealth effects were observed following the price rise in financial instruments. However, for the same period, the effect of nonfinancial wealth was found to be insignificant. Mehra attributes a small spending reaction to nonfinancial wealth whereas his contemporaries entirely dismissed it (Poterba, 2001).

The burst of the U.S. housing bubble amplified scrutiny on nonfinancial wealth and its relation to consumption (Case, Quigley, & Shiller, 2005). Using U.S. panel data for the period 2000-2010, Zhou and Carrol (2012) found a strong relationship between

[3]The Bureau of Economic Analysis and Integrated Macro Accounts adds two other empirically less significant causes of changes in household wealth: volume changes and disaster loss.

current spending and housing wealth, but none when financial wealth is separated. Their findings are consistent with those reported by Mian and Sufi, who show that, despite heterogeneous reactions across regions and income, higher consumption was correlated with growth in housing prices (Mian & Sufi, 2012). In addition to income distribution, wealth-spending reactions vary according to the composition of balance sheets. As upper quintiles hold assets different from those for middle or lower groups, a diverse reaction can be expected from wealth shocks. For instance, housing (primary residence) is a relatively small portion of wealthy American's assets, whereas it embodies two-thirds of those held by the middle quintiles (Wolff, 2012). The larger weight of housing wealth explains why the subprime crash decimated both balance sheets and consumption spending for middle-income groups.

Leading up to the Great Recession, the US was not alone in experiencing a bubble in house prices; wealth effects were observed in other countries in the Organization for Co-Operation and Development (OECD) (Guo & Unal, 2011). The size and speed of the response varies by nation.[4] However, focusing on the US, recent empirical work has uncovered a new consumption trend. Shen, Holmes, and Lim (2013), in their Vector Autoregression (VAR) analysis, find an altered response of consumption to financial and housing wealth for the period between 1973 and 2008. Over the entire period, financial wealth had a larger effect upon consumption. When broken into two periods, housing or real estate wealth shocks are stronger than the effect from financial asset prices in the second. These findings are demonstrated with the use of impulse response functions and variance decomposition. Guo and Unal's (2011) international VAR also presents

[4] Of note, during the last two decades housing price and asset booms can be linked to nations with bulging current account deficits (Laibson & Mollerstrom, 2010). Funds flowing into a nation's capital account not only financed the trade deficit but also buoyed other financial and nonfinancial asset prices.

evidence for a more persistent consumption reaction to financial wealth, but a larger initial shock from housing prices.

2.4 Critiques of LCIH, PIH, and Wealth Effects

From their inception, LCIH and PIH have been subject to criticism.[5] One primary weakness is the inability to explain persistent and growing consumption with flat lining middle incomes. Beginning in the 1970s, the wage share of income ratio has fallen while consumption to income has tracked upward, as shown in Figure 2.1. Adding to the discrepancy is the growth of income inequality (Piketty, 2001) and the rise in wealth disparity (Wolff, 2012) emerging at the same time. Growing wealth, shown in Figure 2.2, could potentially explain overall consumption behavior if all households are experiencing gains, or if those at the top spend sufficiently to offset those not experiencing any of the gain. As neither scenario appears to be occurring, observed income, wealth inequality, and stagnant wages with continued per capita consumption pose a puzzle for consumption theory. Under LCIH and PIH assumptions, middle- and lower-income agents should have been reducing rather than increasing consumption.

Rather than expectations of high future income, households were driven by social motives and increasingly relied upon access to credit markets to smooth out consumption (Barba & Pivetti, 2011; Palley, 2012). Debt and credit flows rose in earnest in 1984 and aggregate net worth followed suit in the mid-1990s. The rise of private debt and household net worth is shown in Figure 2.2. The gap between spending and income has

[5] One avenue of discord focuses on the absence of expected aggregate capital accumulation from that theorized by life-cycle authors (Kotlikoff & Summers, 1980). Accumulated savings should grow from either increased income or population allowing for further growth and investment, both growing until the Great Recession in spite of shrinking household saving. An additional issue is the lack of observed dissaving from retirees (Banks, 1998).

been filled by net worth driven credit and private debt as consumers attempted to maintain their relative consumption levels.

Few LCIH and PIH models address the cumulative rise of private debt in the last three decades and its effect on consumption. When debt markets are incorporated, they are used as a consumption smoothing mechanism, contracted when income is low, and repaid when income rebounds (Hasset & Mathur, 2012). The intuition for individual agent consumption smoothing, though attractive, is not easy to generalize at the macrolevel. Income has not rebounded for middle-income Americans, allowing them to repay debts, and the productivity gap emerging in the late 1970s has only grown.[6] Private debt has risen significantly for middle- and lower-income groups at all ages (other than seniors) while incomes and saving have faltered.[7] The LCIH and PIH explanation for stagnant wages coinciding with rising wealth and debt levels has been unsatisfactory.

The wealth effect literature is a useful augmentation for LCIH and PIH in explaining consumptive behavior with asset price appreciation; however, it has ignored crucial macroeconomic events of the previous two decades. Wealth effects as a supplement ignore debt and posit consumption change when people think financial or nonfinancial asset values have risen. Rather than simple wealth effects, the rise of asset prices in conjunction with debt suggests the real issue is credit supply. The normal story of a wealth shock, up or down, would not require an additional shift in private debt to affect consumption. Instead, an upward shift in wealth provides the collateral allowing access to credit and thus a spending change. Asset price growth and its role for collateral

[6] Productivity has continued to grow for U.S. workers but median household wages have not. One example among many is from the Bureau of Labor Statistics authors Fleck, Glaser, and Sprague (2011).
[7] Household debt only grew from new borrowing during the 2000s. From 1980 to 1998, 'Fisher dynamics' of low-income growth, high effective interest rates, and low inflation were the cause for rising debt to income (Mason & Jayadev, 2012).

and credit availability goes further than what is suggested by traditional wealth effect research.

The wealth effect literature can also be critiqued for its use of a representative, rational, and risk-sharing agent for household spending. Early models combined individual households into one homogenous entity where a representative agent exhibited a small to nonexistent marginal propensity to consume from added wealth (Cochrane, 1991). Another issue was that housing wealth and its influence upon consumption was downplayed. Its omission was due to its nature as both an investment and consumer good. If modeled in this manner, a household is naturally hedged against house price shifts. Positive changes in price that raise an owner's net worth simultaneously increase rental prices for tenants, which results in only minor net changes as renters feel wealthier/poorer when house prices are declining/rising, which are counterbalanced by owning agents. In addition, homeowners may never realize the capital gain from selling the home. Instead, they may continue to live in or pass the asset to their offspring. In the latter scenario, households would not expect large reactions to housing wealth shocks.

Neoclassical models posit that consumption is relatively unresponsive to house price fluctuation so long as households have standard preferences, assets are priced correctly, and no credit market frictions exist. However, when these assumptions are eased, the models' predictions come undone. The spending response of homeowners and renters to wealth is no longer offset. Observed flaws in representative models, such as differences in wealth distribution and varying agent consumption response, demonstrate the need for heterogeneity.

Recent extensions to the wealth effect story link the decline of consumption to

differential debt overhang following the Great Recession. Mian and Sufi (2012) argue that the private debt and credit buildup was unevenly distributed in poorer neighborhoods and that the crash disproportionately affected those regions. Using homes and real estate as collateral, U.S. households increasingly relied upon leverage to finance their spending. Lower income groups responded to a shock to their net worth by reducing consumption expenditures more than the affluent (Mian & Sufi, 2012). For instance, in lower-income regions the average propensity to consume is 5 to 7 cents for every dollar lost in housing wealth, larger than past wealth effect results (2 to 3 cents). Rising prices enable additional borrowing and spending. During a business cycle expansion, poorer regions' consumption responded more positively from access to credit.

Reduced wages and growing wealth inequality forced the neoliberal economy to sustain itself on credit, private debt, and asset price growth. Credit fills the gap in aggregate demand that once was filled by wage growth (Palley, 2012). Consumption and its relation to disposable income appear to have changed, but permanent/expected income or simple wealth effects are unable to fully explain the shift. Rather than diminished consumption as incomes and wealth fell, middle-income Americans resorted to private debt to keep their relative consumption in line with their neighbors.

2.5. Related Narratives: The Relative Income Hypothesis and the Financial Accelerator

Duesenberry's relative income hypothesis provides an additional explanation of consumption beyond LCIH or PIH (Barba & Pivetti, 2009; Cynamon & Fazzari, 2013; Duesenberry, 1949). Rather than projecting a future income stream, individuals attempt to keep their consumption at a level relative to their social settings. Expenditure can be

linked to local and societal norms as agents try to maintain status. In contrast to an absolute level of consumption that might move with income, households are more concerned with 'keeping up with the Joneses' in a manner similar to Veblen's conspicuous consumption.

Income and wealth remain important, but now psychological nature and herd behavior also influence household spending patterns. As with Veblen, Duesenberry accords an important role to habit formation, meeting of local norms, and the social visibility of consumption. Households purchase 'customary necessities' to emulate their neighbors and keep pace in the neighborhood. Consumption occurs as a response not only to individual motives such as income or need, but also to societal 'demonstration effects.'[8]

Additional LCIH and PIH critiques emerge from Post-Keynesian (PK) models of consumption, which distinguish the spending behavior of different income classes. Keynesian theory states that those with lower incomes will have a higher marginal propensity to consume (MPC) than higher-income groups. For example, Cynamon and Fazzari separate the spending of the top 5th from the remaining 95th percent of income distribution (2013b). Spending by the 95th percent rose while the top 5th remained the same in the consumer age.

[8] Post-Keynesian authors Cynamon and Fazzari focus on the social psychology and the connection between marketing and consumer identity for what 'one ought to do.' Changing social norms have allowed the growth in the consumption ratio and how individuals choose to consume (Kim et al., 2013; Palley, 2010). Their "main argument is not that American consumers borrowed more simply because they could borrow more in the new institutional environment, but that changing social norms made it seem normal to spend more (as opposed to desirable to consume more -which is always the case) as well as normal to borrow in order to finance that spending (which was certainly not the case)" (Cynamon & Fazzari, 2013a, p. 131). While related, our work differs from that of Cynamon and Fazzari in its asset price inflation emphasis. Wealth and capital gains are acknowledged in their work but dismiss this possibility due to extreme wealth inequality. This is readily recognized. However, in agreeing with their latter point, the relaxation of liquidity constraints, we feel they downplay the role of asset prices in enabling added credit. However, the remainder of this chapter aligns with their focus on a Minskyan interpretation of household debt and the social side of consumer spending.

Other Keynesian and Kaleckian models divide spending by laborers and profit earners where functional income is divided between profits and wages (Pasinetti, 1962).[9] Wage earners are assumed to consume their entire incomes whereas saving is done by capitalists. Economic activity and growth occur from greater wage share/profit share in wage-led/profit-led economies. Power and class dynamics are introduced as a higher wage share arises only from worker bargaining power and lower unemployment rates.[10]

The composition of household balance sheets, which differ by income quintile, is also crucial to spending behavior. Middle- and lower-income households were more likely to hold wealth in their primary residence and use it to leverage future purchases, whereas higher wealth groups held financial assets (Wolff, 2012). Middle wealth quintiles were able gain ground in wealth accumulation during boom periods from higher debt and leverage ratios, but they were also more severely hit by the housing crisis. Consumer demand from lower income groups fell in part from the configuration of their balance sheets and its dependence upon primary residence.

With the wealth and income shift of the 1980s, consumption functions are increasingly disparate for profit and wage earners; the effects are far reaching. The "redistribution of income lowers the absolute income of low-income households and increases that of high-income households. Since low-income households have a higher

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[9] PK models are also highly critical of the homogeneous agent and perfect foresight for spending behavior. Instead, authors such as Marc Lavoie (2004) suggest 'procedural rationality,' where agents avoid complex calculations from a lack of perfect knowledge. Microbehavior builds on social conventions and observed behavior of others (Lavoie, 2012). They are also highly critical of the notion that market prices are the key determinant to spending decisions. Rather than the principle of substitution or PK, models suggest that income effects and income distribution are far more important to household demand (Arestis, 1996). Social interaction, class structure, and income /wealth distribution have an additional and possibly greater role in household consumption than that of rational expected income.

[10] Bargaining power as seen through unionization rates has declined in the US and with it labor or wage share for the past 30 years. This shift has coincided with rising income inequality. Middle- and lower-income demographics have had less to continue their purchasing, and the rich do not spend enough to keep aggregate demand propped up.

MPC, this lowers aggregate consumption spending" (Palley, 2010, p. 49). Differential consumption functions also imply varying propensities to save. As distribution has favored top deciles, spending out of income from the wealthy has not grown; instead, upper income groups are saving more (Carrol, 1998). Thus, rising income inequality itself would have led to lower aggregate consumption growth, which has not been observed in the neoliberal era. The inconsistency was enabled through rising access to credit and the resultant buildup of debt.

If wages fail to grow, middle- and lower-income groups are the most likely candidates to turn to other means to finance expenditure. Growth of credit availability, emerging in the 1980s and its continued expansion with asset inflation of the 1990s, has been the primary pathway. Duesenberry's relative theory of consumption explains why lower- and middle-income groups have been willing to use debt to keep up with their neighbors. Consumption as a ratio of income, seen in Figure 2.1, has not only remained stable but actually grown.

Bernanke and Gertler's 'financial accelerator' provides another conceptual framework to study consumption that goes beyond LCIH/PIH or wealth effects. It also provides an extension for asset price inflation in PK models. The 'financial accelerator' refers to the endogenous response of credit supply over the business cycle, which amplifies and propagates shocks within the economy (Bernanke & Gertler, 1999). It links the net worth of borrowers to the external finance premium of lenders, where the latter depends inversely upon the former because of capital market imperfections. The external finance premium is the difference between the cost of funds raised externally and the opportunity cost of funds internal to the firm. The net worth of potential borrowers in turn

is equal to their liquid assets plus the collateral value of illiquid assets less outstanding obligations.

An inverse relationship exists between net worth and the external finance premium because when "the potential divergence of interests between the borrower and suppliers of external funds is greater," the lower is the wealth borrowers have to contribute to project financing (Bernanke & Gertler, 1999, p. 1345). The ability of borrowers to post some collateral decreases the risk of lenders and aligns the incentives of both. Because a borrower's net worth moves with asset prices and profits, credit supply has become procyclical. The issue is magnified as financial intermediaries' ability and willingness to supply credit is also a function of their net worth. When macroeconomic and financial conditions deteriorate / improve, both borrowers' and lenders' debt burden increases / decreases, bringing about a contraction / amplification of the credit supply.

The financial accelerator (FA) builds on Irving Fisher's early observation of symmetric financial amplifications of the business cycle in both boom and bust periods. The modern FA's effect need not be symmetric and primarily works through asset prices and collateral. Rising asset prices during an economic expansion increase the ability of firms and agents to obtain loans, and the process works in reverse during the bust (Panetta & Angelini, 2009). Similar cyclical activity hits banks' balance sheets. Asset price growth acts to raise capital, which then reduces leverage ratios unless financial intermediaries proactively leverage to keep this ratio constant as security brokers and dealers have done (Adrian & Shin, 2008). During a downturn, asset price deflation reduces capital and increases the leverage ratio. Unless they find a means of increasing

capital, which is unlikely, banks are forced to reduce their asset holdings, i.e., credit supply, creating an added negative force on asset prices.

Early FA literature built on and fed back into the new Keynesian theory of business investment. For example, Steve Fazzari's work ties the scale of investment volatility to cyclical changes in internal finance and the strength of a firm's balance sheets. Emerging in the early 1990s, these models focused on "fluctuations in internal net worth as a key factor in propagating, magnifying, and even causing cyclical fluctuations" (Fazzari, Petersen, & Hubbard, 1993, p. 340). The level of internal net worth rather than interest rates, or flows of saving, became the driver and constraint on investment. The importance of firm net worth has grown in each business cycle since the 1990s (Arestis & Karakitsos, 2013).

Heterodox authors have also recognized the growing link between finance and asset prices within the U.S. economy, though they focus primarily upon connection to the business sector (Palley, 2007). Finance has transformed the economy at the macro- and microlevels, and the role of finance has grown in proportion to the real sector.[11] Krippner (2005) describes financialized firm behavior, following a "pattern of accumulation in which profit making occurs increasingly through financial channels rather than through trade and commodity production" (p. 174).

The role of financial stance in amplifying lending behavior and business

[11] Though financial economics is prominently studied in many schools of thought, asset price volatility and its macroeconomic effect are not so well considered. Modern textbooks continue to pay homage to Friedman's notion of stabilizing speculation and in the same vein, variations of the efficient market hypothesis. Until the housing bubble, many financial economic models were still based on adaptive and rational expectations where all information is easily available to market participants who make rational and optimal decisions. Models such as these oversold financial markets' ability to manage risk. Both narratives appear in stark contrast to reality and Keynes's famous warning about a situation "when enterprise becomes the bubble on a whirlpool of speculation" (Keynes, 1936, p. 159).

investment has been extensively explored, though less attention has been paid to its role in augmenting household expenditures. Household consumptions' growing connection to financial stance has occurred through what we refer to as the net worth, credit, and spending link. As Bernanke (2007) notes, "changes in house prices may affect household borrowing and spending by somewhat more than suggested by the conventional wealth effect" (p. 2). Homeowners' net worth influences their own external finance premium (and thus costs) and access to credit. Wealth bulges at both macro- and microlevels have lowered barriers for household finance, and the trend of consumption has acquired a level of independence from the underlying trend in household income.

2.6. Testing the Asset Price-Credit-Consumption Link

Drawing from the FA framework, the conceptual framework developed in this paper accounts for the explosive rise of private debt, by emphasizing the link between asset prices and credit. The interrelationships of the latter variables with financial liberalization of the late 1980s have allowed for changing consumption dynamics. The growth of asset values is shown in Figure 2.3 and Figure 2.4, where financial assets are represented by the S&P 500 and nonfinancial asset prices by the Case-Shiller index in comparison to the consumer price index (CPI). In the earlier period, the S&P tracks CPI closely, and after 1984 diverges significantly. On the other hand, CPI tracks well with the Case-Shiller index until 2000. In both cases, asset prices grew roughly in tandem with CPI before 1995, but not after.

Asset price and credit growth have changed household spending patterns in a manner similar to Bernanke's FA for business and banking decisions. The shift began

with economic policy and ideological change in the neoliberal era in conjunction with the rise of asset prices as shown in Figure 2.3 and Figure 2.4. Financial innovation, securitization, financial deregulation, and the removal of capital controls have created new dynamics for domestic credit and asset prices. In short, this chapter posits that rather than solely a wealth-consumption link, it is more appropriate to term the phenomena an asset price-credit link that permits the financing of consumer expenditure beginning in the mid-1990s.

To test for these new dynamics, an analysis of the essential time series variables and their interaction is necessary. With a focus on households' consumption, our work first reproduces and adds to existing wealth effect findings using consumption, disposable income, financial assets, nonfinancial assets, and in the later analysis, nonfinancial private debt. All data are real and obtained from the National Income and Product Accounts (NIPA) and Integrated Macro Accounts (IMAs). Tests for stationarity suggest that our variables should be differenced, integrated of order 1 or I(1). Results for Augmented Dicky-Fuller Tests are presented in Table 2.1.[12]

Other strands of wealth effect literature invoke long-run variable relations through error correction models (Case, Quigley, & Shiller, 2005). Cointegration was considered for our I(1) data and is shown in Table 2.2 for the entire data period.[13] The null of no cointegration can be rejected as one might expect from the long-run relationship between income and consumption. However, the work here relies upon vector autoregressions

[12] Following concern from Sims (1980) that the differencing of data removes co-movement and performance from variables, we also used log levels without transformation, which is the approach of Guo et al. (2011) in their treatment of the data. Our results are roughly similar for both VAR models when analyzing the data without differences and are available upon request.

[13] Johansen cointegration tests were also performed on the variables levels as well, confirming the need to use first differences. Table 2.2 reports its findings.

(VAR) for multiple reasons. First, test results in Table 2.2 suggest the differenced data can provide nonspurious results. Second, error correction models rely on a single cointegrating vector, which likely holds for consumption and income but not the wealth or credit variables. In addition, they omit feedbacks from consumption on the other variables (Shen, Holmes, & Lim, 2013). Following Carroll, Otsuka, and Slacalek (2011), we question the implication that consumption theory has multiple long-run cointegrating relationships.[14] Finally, one aim of our study is to chronicle if and how consumption dynamics have changed in the neoliberal era with rising wealth and credit ratios. VARs are created for three eras following structural breaks observed in credit found by Ozgur and Erturk (2013).

By means of the same VAR methodology used to study wealth effects, the link between asset price growth, credit, and household spending is demonstrated by substituting credit and debt into the key equations. The role of credit and wealth driven by asset revaluation is especially evident after the mid-1990s.

2.7. Vector Autoregressions: Wealth or Credit

The essential specification for analyzing wealth effects takes the form of $C_t = \alpha + B_1 Y_t + B_2 FA_t + B_3 NFA_t$, where *C* stands for consumption, *Y* disposable income, *FA* financial assets, and *NFA* nonfinancial assets. Each *B* estimates the coefficient and marginal spending out of income, financial, and nonfinancial variables.

[14] The existence of a stable long-run cointegrating vector is questioned because, "a change in the long-run growth rate or the long-run interest rate should not change the relationship between consumption, income, and wealth. Second, even if changes to the cointegrating vector are ruled out by assumption, changes in any other feature of the economy relevant for the consumption/saving decision can generate such long-lasting dynamics that hundreds or even thousands of years of data should be required to obtain reliable estimates of that vector" (Carroll, Otsuka, & Slacalek, 2011, p. 2). The issues are also discussed in Slacalek (2009).

VAR models are a useful nontheoretic method that demonstrates the dynamic interaction between variables in a systematic manner. VARs are *n*-equation and *n*-variable models where each variable is explained by its own lagged values along with current and lagged values of the other *n-1* variables.

A reduced form VAR is specified by $X_t = B_0 + \sum_{k=1}^{K} B_k X_{t-k} + E_t$. Now *X* acts as the vector of variables *(C, Y, FA, NFA),* while B_k is the matrix of coefficients for the *k*th lag of X_t, and E_t is the vector of reduced form innovations. VARs have the explicit advantage in that all variables are treated as endogenous. However, to causally interpret the variables, interaction-identifying assumptions must be made. Adopting Cholesky restrictions, components of the matrix enter in a strict manner.[15] Our ordering of the variables is *(C, Y, FA, NFA)*, but rearranging the order does not affect our results. The value of lag *K* is determined at 3 using the Bayesian (BIC) and Akaike Information Criteria (AIC).

The initial wealth effect VAR model is able to re-create significant results from other research on financial and nonfinancial wealth shocks (Guo & Unal, 2011; Shen, Holmes, & Lim, 2013). Shen et al. begin their observation by separating their data between 1975 to 2000 and 2001 to 2011. Using data from the IMAs presents a longer time set, beginning in 1960, which allows for a three-period observation. The periods of interest are from 1960 to 1980, 1980 to 1996, and 1996 to 2013.[16] The latter era aligns with significant U.S. asset price growth as shown in Figure 2.3 and Figure 2.4. In line with Guo and Unal (2011), our VAR model provides impulse response functions and

[15] To identify the structural model for a VAR, it is necessary to impose $(n^2 - n)/2$ resrictions. Many VARs are sensitive to the ordering of variables, where model assumption can alter results. Neither of our VAR models depends on ordering or alterations. Diagnostic and stability tests for both VAR models were performed and are available upon request.

[16] The breakpoints utilized here follow structural breaks observed in credit from Ozgur and Erturk (2013).

variance decomposition.

Impulse response functions are a useful function of the VAR toolkit that demonstrate the reaction of current and future values of consumption to a positive shock in financial and nonfinancial wealth. The elastic response is plotted for 20 periods ahead and exhibits the reaction in the variable of interest to innovations in another. Estimation uncertainty is visualized through confidence intervals, which are created with bootstrap methods. The bootstrap application runs 100 replications returning 95% confidence intervals. Figure 2.5 and Figure 2.6 demonstrate the whole period's consumption (dlc) response to a unit change in wealth (dlfa-financial and dlre-real estate). Our findings align with those of Guo and Unal (2011); financial wealth shocks have larger effects than those of nonfinancial over the entire period. Using the IMA data allows us to run this VAR model for a longer time span and utilize differenced log levels of wealth instead of indexes.[17]

Following Shen et al. and dividing the data into three subperiods reveals the progressive effect of nonfinancial wealth and a reduced impact of financial assets on consumption (2013). Figure 2.7 depicts a slightly diminished consumption reaction to financial wealth in each time span. The image on the far left is the consumption response for a financial asset shock from 1960 to 1980, the middle 1980-1996, and the right 1996-2013.[18]

Figure 2.8 presents the reaction of consumption to a shock in nonfinancial wealth for the same three periods. While the reaction to equities builds before tapering off,

[17] Guo and Unal found similar results in their impulse response functions when using levels of wealth or indexes for equity or housing wealth. We have also performed this function, though for a shorter time period as housing indexes do not stretch as far back as the IMAs.

consumption in response to real estate is raised in the third era.[19] In the middle sub-period, consumption's impulse response to both financial and nonfinancial assets falls. The initial spike in consumption from financial wealth is smaller before declining. In contrast, consumption in response to nonfinancial wealth falls immediately and takes over 10 periods to stabilize. Shen et al. (2013), in their two-period analyses, miss this period's negative response and the likely role of high real interest rates of the 1980s. In the third period, consumption's response to nonfinancial shocks far exceeds that from financial ones, driven by the increased importance of nonfinancial assets.

Forecast error decomposition is another important indicator of the influence that one variable's variation may have upon another. According to Stock and Watson (2001), this is "the percentage of the variance of the error made in forecasting a variable due to a specific shock at a given horizon" (p. 7). Variance or forecast decomposition for consumption, income and the wealth variables for the entire period are created in row one of Table 2.4. The aggregate results align with previous literature where financial price effects are larger than nonfinancial asset price effects for the whole period (Shen et al., 2013). Income effects are likely captured by the previous period's consumption in column one. When the data are separated into three eras, a new narrative emerges. Real estate price effects begin to gain ground, overtaking financial wealth in their expected effect upon consumption 10 periods out. In the last period, 21% of the error in consumption forecast is attributed to real estate and only 7% to financial assets. Our work

[19] For Sections 2.7 and 2.8, the consumption variable is personal consumption expenditure (PCE) from the NIPAs. However, in Section 2.9 consumer durables are utilized as our proxy for consumption. The former variable is useful in its relation to the wealth effect literature, but the latter is better suited for planned forms of consumption with changing asset values. Though not highlighted in this paper, a VAR model has been performed that compares durables spending to income, financial assets, and nonfinancial assets. The reaction of durables to financial asset shocks is largely similar to the full consumption variable. In contrast, durables in relation to nonfinancial assets respond more positively in each of the latter two periods.

adds to the literature with its U.S. concentration, longer data span, use of IMAs, and a third era showing the growing impact of housing wealth shocks.[20] Financial shocks have a greater effect on wealth and consumption in the first two periods whereas housing or nonfinancial wealth becomes more important in the third.

The previous VAR model displays wealth effects from asset shocks, but it ignores the interrelation of household wealth and credit. Utilizing the same VAR method, the model is altered by combining financial and nonfinancial wealth into one net worth variable and adding private debt. The approach is more holistic than that specifying the wealth effect and attempts to capture the effect of a change in the level of credit on consumption. Continuing to use impulse response functions, Figure 2.9 shows the reaction in consumption to a shock in private debt (dlpd) and then net worth (dlnw) for the entire period. Net worth's positive effect persists in Figure 2.10, and the shock from private debt quickly goes from positive to negative. Though reading into response functions with more than 15 lags can be problematic, both variables stay within an expected confidence interval.

Moving into the three-period analysis, asset price driven net worth continues to be an important factor for consumption. However, its effect within impulse response functions does not change much and slightly declines in the latter period. As opposed to disaggregated wealth shocks from our earlier VAR model, the combined financial and nonfinancial net worth shock to consumption is relatively constant over the three eras.

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[20] As outlined earlier, an issue for measuring aggregation of consumption response given high income and wealth inequality within the US. For example, top income or wealth groups may receive 100% of the benefit from the past two decades of asset price growth, while spending very little on consumption. In contrast, lower-income groups may spend significantly (with higher marginal propensities to consume) without receiving any benefit from wealth growth. However, the growth of net wealth in the US is a key aspect in explaining continued consumption growth even at the aggregate level.

The main difference is the fact that wealth shocks are transitioning from those driven by financial causes in the first two periods to nonfinancial in the third. Figure 2.11 demonstrates the effect of a net wealth shock to consumption. In each of the three periods, the response remains high.

In contrast to changes in net worth, the relation between private debt and the response in consumption has been transformed. From the first to third time frame, consumption response to shocks to private debt, shown in Figure 2.12, doubles within the first 10 periods. The wealth effect literature recognizes the importance of financial shocks, but its treatment of credit and the ability for households to finance spending in the latter part of the neoliberal era is inadequate. Also, the impulse responses from private debt on consumption in the middle and last period in Figure 2.12 are similar to shocks from nonfinancial wealth or real estate in Figure 2.8, where nonfinancial wealth and private debt responses are minimal in the 1980-96 period but expand for 1996-2013.

Further study of the components of private debt and real estate is needed to properly explain this phenomenon. One explanation from Mason and Jayadev (2012) suggests analyzing the full 'Fisher dynamics' of household debt for three time periods. Their findings are similar to those of this study. During the middle period 1980-1996, negative effects from slow income growth, and high interest rates led to increased debt to income ratios rather than new borrowing. That relation changed in the latter period, especially from 2000-2006, as households increased new borrowing in the early days of the subprime bubble.

The role of net new borrowing also shows up in Table 2.5's variance decomposition. Though small in all periods, variance in consumption from a private debt

shock rises in the last two periods. The opposite shows up for aggregate net worth: its explanatory power diminishes to only 13% of variation in the latter era, only slightly above that from private debt. Past consumption remains its own biggest determinant, but income varies little over all periods. Income effects are likely captured by the previous period's consumption.

Whereas private debt and net worth ratios were on the rise in the late 1980s, it was not until asset price inflation sped up in mid-1990s that the nature of consumption spending changed. An essential difference was that debt from new borrowing only rose after 1998, while from 1980 to 1998, changes in the debt to income ratio were from other factors: low income growth, disinflation of the 1980s, and higher effective interest rates (Mason et al., 2012). The tech stock boom and the appreciation of nonfinancial assets have altered how consumption responds to debt and credit. Rising asset prices enabled household borrowing in the latter era through increased wealth to finance expenditure.

Asset revaluation had little influence upon consumption prior to financial liberalization. Afterwards, however, the impact of asset prices increased in a manner more complex than the wealth effect story suggests. Household wealth or net worth in this final period acts in a manner similar to that of business net worth on investment. The higher asset values increased not only household wealth but also household access to credit. Thus, private debt accumulation made possible by price appreciation has allowed household spending to continue to rise at a time when wages and incomes have faltered.

2.8. Asset Prices and Consumption

The net worth-credit link is further explored by comparing the effect of net worth on consumption with the direct effect of asset prices and consumption. The difference appears slight but has significant macroimplications. Again, using IMA and NIPA data allows separation of the key components in household net worth. These components include holding gains from asset price revaluation, flows of net saving, volume, and capital transfers. Of these, holding gains and net saving are the key drivers, whereas the other two have a minimal effect. Holding gains/losses are the revaluation of financial and nonfinancial asset values from one period to the next if sold by their owner and act as our proxy for asset price change. Once holding gains are disentangled from net worth, a comparative analysis can be made for the change in consumer spending resulting from asset price revaluation versus changes in net worth.

Figure 2.13 presents scatter diagrams for growth of consumption and changes in the net worth ratio for the three time periods outlined earlier. Data are quarterly and differenced for consumer durables and the household net worth to income ratio.[21]

Though dispersed and far from linear, the scatter points narrow in the third era, presenting an argument for an increased role of wealth effects. The first two periods of Figure 2.13, 1960-1980 and 1980-1996, show minor reactions in consumption to changes

[21] Following Yamashita (2013), we alter our time series data for Figure 2.13 and onward:

$$Change\ in\ Net\ Worth\ to\ Disposable\ Income\ ratio_t =$$
$$(\ln(\ Net\ Worth_{t-1}/\text{Disposable Income}_t) - \ln(Net\ Worth_{t-5}\ /Disposable\ Income_{t-4}) * 100$$
$$Change\ in\ Net\ Worth\ to\ Disposable\ Income\ Ratio\ Due\ to\ Holding\ Gains = \frac{\sum_i 4{=}1\ Holdinggains_t}{Disposable\ Income_t}$$
$$Change\ in\ Net\ Worth\ to\ Disposable\ Income\ Ratio\ Due\ to\ Other\ Changes =$$
$$\left(\frac{Net\ Worth_{t-1} - \sum_i 4{=}1\ Holdinggains_{t-1}}{Disposable\ Income_t}\right) - \left(\frac{Net\ Worth_{t-5}}{Disposable\ Income_{t-4}}\right)$$
$$Growth\ of\ Durables\ Consumption_t = [ln(\ Durable\ Goods_t / PCE\ Deflator_{\ t})\ - ln(Durable\ Goods_{t-4}\ /$$
$$PCE\ Deflator_{t-4})] * 100$$

Similar equations are used for nondurables and services, nonresidential fixed investment, and growth of residential fixed investment. Our price index is the PCE deflator from NIPA 2.3.4.

in net worth. However, in the latter period of Figure 2.13, a positive response in durable spending from a change in the net worth change can be observed. Modest correlations from these periods are presented in Table 2.6. Each of the three periods contains multiple recessions; asset price spikes and dips in addition to short period wealth effects.

As discussed by Carroll, Otsuka, and Slacalek, no long-period, cointegrating relation between the major variables contributing to consumption should be expected or observed (2011). In Table 2.6, the earlier two periods display little to no correlation. The minimal reaction in consumption to wealth in the early periods aligns with our VAR model's results. Financial liberalization and increased credit availability are the likely causes, but the role of nonfinancial wealth such as housing has acted as a driving force on consumption in the third period.

Figure 2.14 depicts the relationship between the growth of consumption (durables) and the change in the net worth ratio for the entire period. Little if any association can be gleaned from this image. Figure 2.15 and Figure 2.16 decompose changes in net worth to its two main components, holding gains and savings, and depict how each correlates with consumption. Unlike the positive relation consumption has with holding gains, its association with net saving (plus volume, and capital transfers) appears to be negative.[22] Recognizing some dispersion, spending is more positively connected to holding gains than it is to net worth for the entire period.

Figure 2.17 presents the relation between holding gains and consumer durable growth in a three-period comparative analysis. The influence of holding gains is once again isolated from other components of net worth. In the first two subperiods, there is

[22] The paths of household net worth to disposable income, holding gains, and consumer durables are shown in Figure 2.18.

little correlation. This finding is similar to that for the earlier periods of Figure 2.13, which used the net worth to income ratio. However, the latter period of Figure 2.17 shows a stronger link between consumption and asset price revaluation. This connection is also shown with simple correlations in Table 2.6. Clearly, the relation between consumption growth and asset prices is tighter than that with wealth changes.

The three subperiods coincide with progressive stages of financial liberalization and financial deregulation in the US. The first subperiod witnessed financial innovations leading to increased competition for depository institutions in the 1970s. The rise of money market deposit accounts, Eurodollar markets, federal funds market, and internationally the demise of Bretton Woods drastically changed the U.S. financial structure. The first wave of deregulation in the 1980s marked the end of interest rate limits in Regulation Q. The effect was a widening of long investments that banks could make following the Garn St. Germaine Act. The second wave of deregulation started in the mid-1990s, allowing an increased role of derivatives and securitization of financial products and culminating in the Graham Leach Bliley Act in 1999.

The tighter relationship of consumption with holding gains than with net worth is not entirely surprising after scrutinizing recent asset price and saving behavior. After 1995, U.S. asset prices grew significantly, outflanking other price indicators (Figures 2.3 and 2.4). At the same time, the household sector, which acted as a net lender until 1980, began reducing its supply of savings, yet the U.S. economy continued to grow. Residual or net household saving declined from 10% of disposable income to less than 0.5% in 2006. The rise in household net worth was solely due to holding gains given that the effect of net saving was nil.

As will be discussed further in Chapter 3 and Chapter 4, the link between asset prices and expenditure is credit. Asset prices, especially house prices, are important as they act as a form of collateral allowing for both increased borrowing and lending. Asset price volatility in its influence upon credit conditions has significant effect on the expenditure of households and firms. The relation between credit and asset values has tightened in the last two decades.

The positive response of household net worth to holding gains and its negative reaction to saving are exemplified by the mid-2000s. During the latter portion of the neoliberal era, asset prices, private debt, and household net worth were reaching new highs (Figures 2.2, 2.3, and 2.4), and the financial system was flush with liquidity in spite of minimal saving from households. With the onset of the Great Recession, residual saving grew but could not prop up net worth when faced with massive asset devaluation. Instead, aggregate net worth declined. An unforeseen and important implication is that any positive effect from household saving is overshadowed by the effect of asset revaluation and household deleveraging.

2.9. Conclusion

Economists such as Keynes, Duesenberry, and Friedman/Modigliani have advocated varying macroeconomic theories for consumption. Friedman and Modigliani, in their permanent income and life cycle hypotheses, attempted to go beyond the Keynesian marginal propensity to consume out of income. Each also attempts to explain how long-run consumption could be less volatile than income. In both theories, rational agents make spending decisions according to the current level of income and a permanent

expected income. It is anticipated that income for an individual will be less than spending during the early and late phases of life, with either borrowing or dissaving filling the gap. Only in life's middle years will income exceed spending and one can pay down debt and save for retirement.

The LCI and PI hypotheses were thought to capture consumption behavior reasonably well until the 1990s, beyond which their explanatory power began to diminish. Younger agents readily took on debt, but their ability to repay and save during life's middle stages decreased. In the late 1970s, middle-income workers could no longer expect rising permanent income as growth of wage income and labor productivity diverged. U.S. households continued consuming in spite of diminished incomes. During the same period, households reduced their saving from 10% of disposable income to less than 0.5% in 2006. The lack of observed saving and stagnant middle incomes in the face of rising income inequality are at odds for the LCI and PI hypotheses.

In the 1990s, researchers emphasized 'wealth effects' as private wealth began to soar from the equity boom as an extension to the LCI and PI hypotheses. With the run-up of real estate prices during the subprime episode, researchers incorporated housing wealth in their analysis of consumption behavior. Both the equity and housing bubbles made significant contributions to consumer spending by raising household net worth. Financial wealth shocks were larger and more persistent from 1970 to the present, but in the latter two decades, consumption has responded more to nonfinancial asset shocks (Guo & Unal, 2011; Shen et al., 2013).

Simple wealth effect explanations of consumption have also proved inadequate. A focus on the wealth-consumption relation ignores the increased importance of asset price

appreciation on households' ability to finance their spending through private debt. Asset price changes have always contributed to household net worth, but in a financially liberalized environment, such gains now have greater significance. Growing asset wealth raises the value of collateral and thus credit access. The 'wealth effect' narrative is too simplistic in its omission of private debt, credit, and the growth of U.S. financial markets.

Bernanke's 'financial accelerator' provides a useful framework for incorporating financial variables in the study of macrophenomena. However, most research in the FA vein focuses only on the firm's net worth and spending. Business wealth not only acts as a source of finance but also reduces the external finance premium. Firm investment and access to credit are thus linked to its internal financial stance. Heterodox authors such as Minsky have also recognized the importance of finance upon the real economy, again stressing the relation at the firm level. Though it has not received nearly as much attention, a similar wealth-credit link holds for households, which explains the strong relationship between asset revaluation and consumption. The mixture of price appreciation in both financial and nonfinancial assets fueled credit growth and increased household access to financial markets. Middle- and lower-income groups maintained their relative levels of consumption through borrowing in these markets. This finding goes further than Bernanke, who suggests only a magnifying of the 'conventional wealth effect.'

Our VAR analysis adds to the wealth effect literature, but suggests the importance of credit in the 2000s. Consumption responded positively to financial (equities) during the dot-com bubble and to nonfinancial (primarily real estate) wealth during the housing bubble. Impulse response functions and variance decomposition confirm the growing role

of housing wealth upon consumption from 1996 onward. However, financial wealth effects are higher over the entire period 1960-2013. Our VAR goes beyond the basic wealth effect by showing that consumption growth resulted not only from the increase in wealth from inflated asset prices but also from the positive impact net worth had upon access to credit. Impulse response functions clearly show the increased connection between consumption growth and the turnover of new debt.

Finally, we show that consumption has a tighter link with asset prices than it does with household net worth. Though the difference is slight, this finding aligns with the fall in household saving in the neoliberal era especially during cyclical upturns. In booms, households reduce precautionary saving, yet wealth continues to grow from asset price revaluation. During the bust, saving picks up but is still overshadowed by the fall of existing asset prices. Net saving may have a negative effect upon the cost and availability of credit, which is yet to be addressed in the FA literature. Interaction between saving, credit, and asset prices will be explored in Chapter 3. The relationship between consumption, income, and saving has been altered by asset price appreciation in the period following the mid-1990s, when even consumer spending has been financialized.

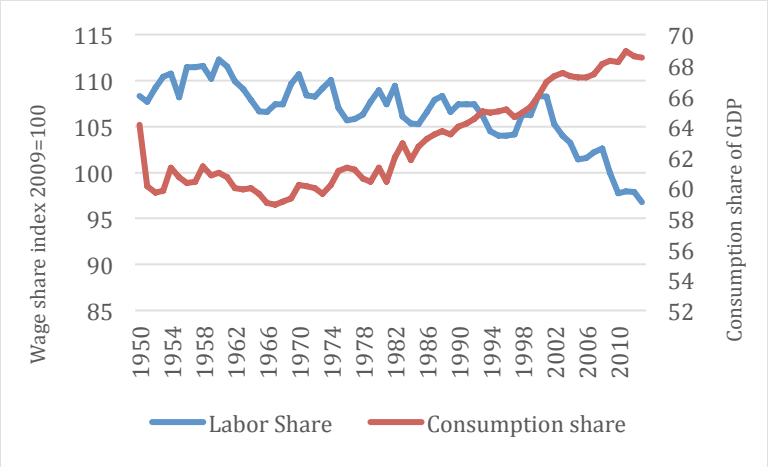

Figure 2.1 Annual nonfarm labor share of output (left) and consumption ratio (right).

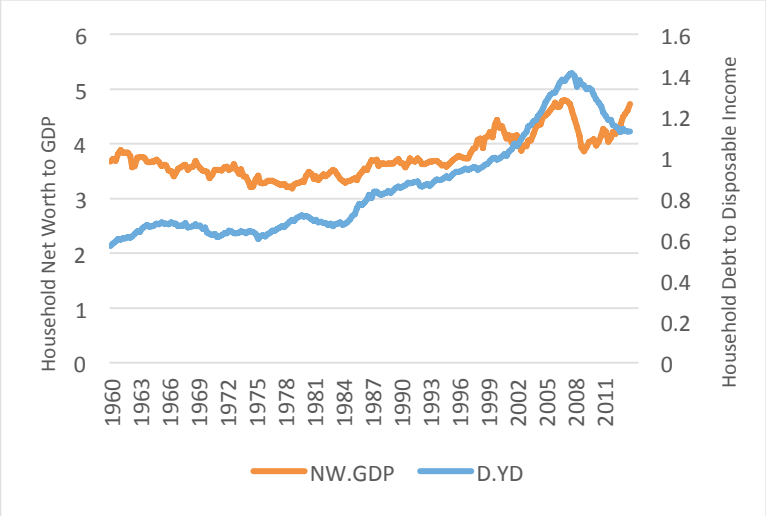

Figure 2.2 Household net worth to GDP and household debt to disposable income.

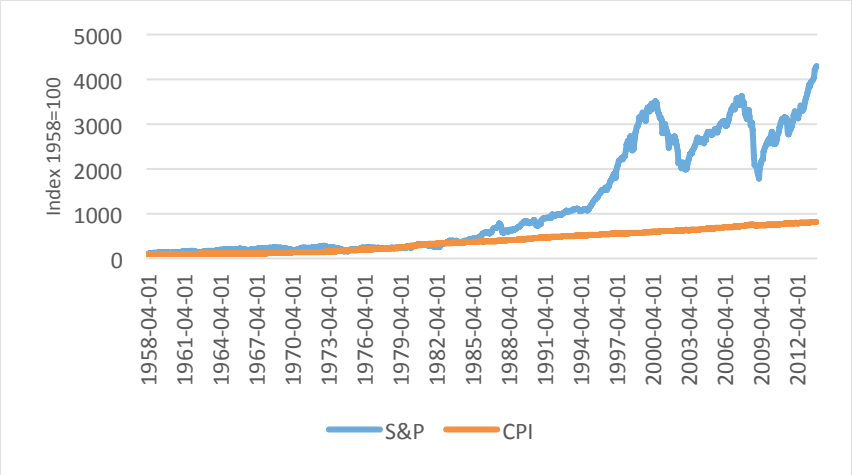

Figure 2.3. S&P 500 and consumer price index.

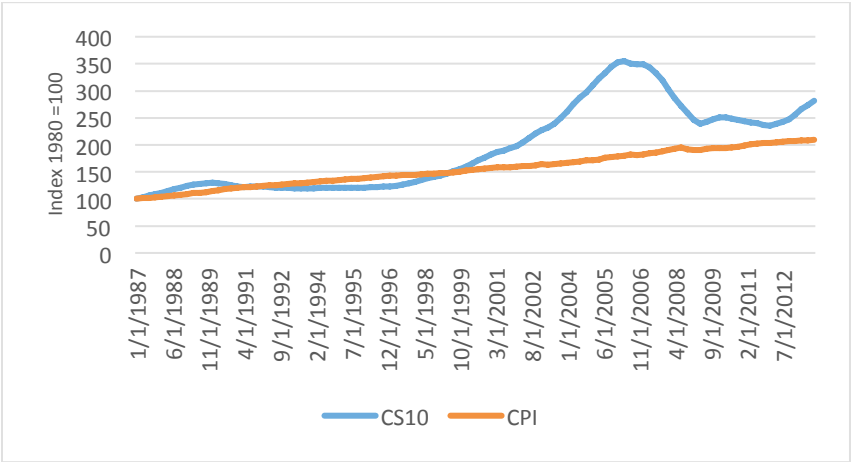

Figure 2.4. Case-Shiller 10-city index and consumer price index.

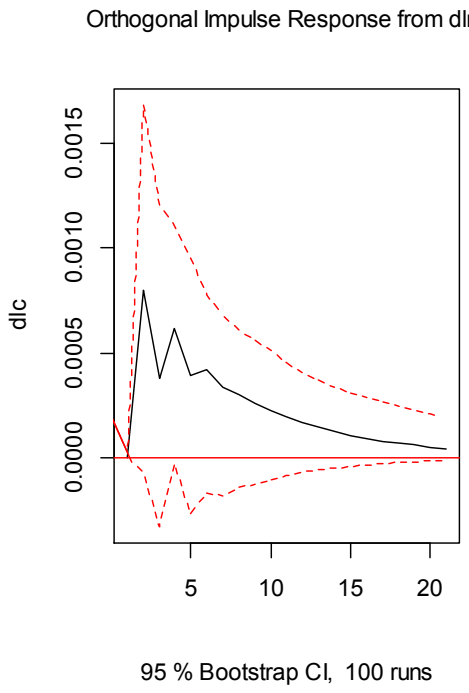

Figure 2.5. Impulse response of consumption to a nonfinancial price shock (whole period).

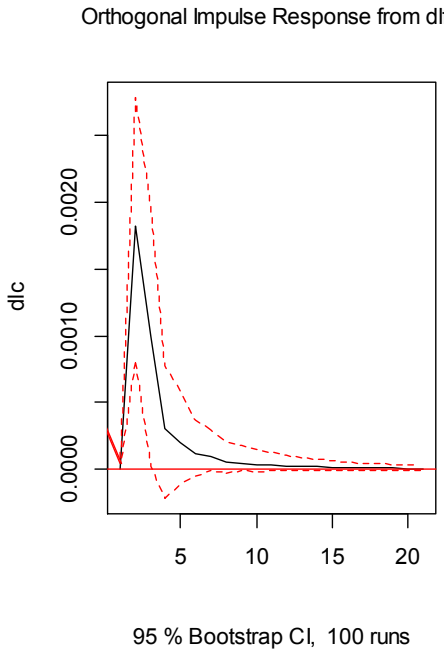

Figure 2.6. Impulse response of consumption to a financial price shock (whole period).

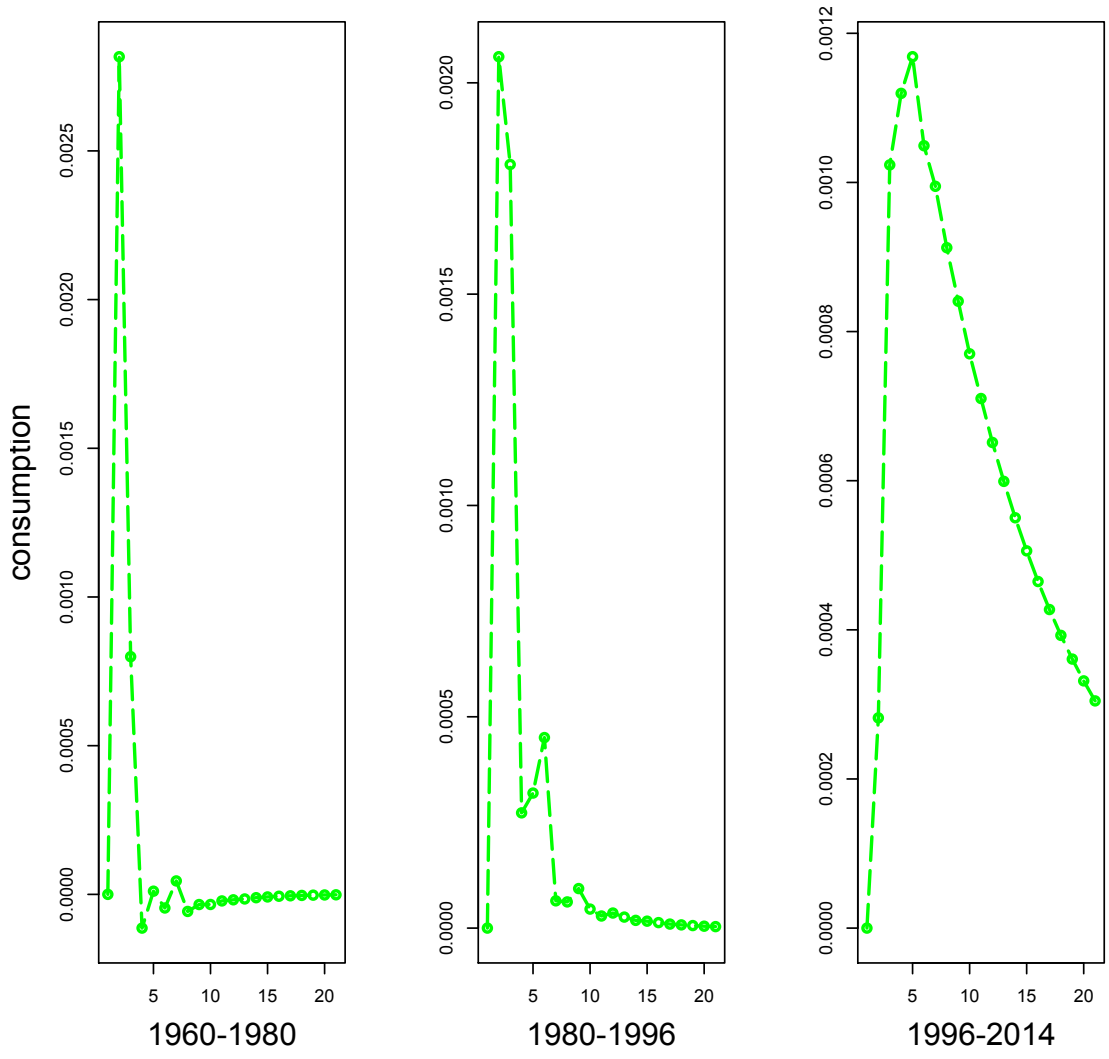

Figure 2.7. Impulse response from financial wealth upon consumption (1960-1980-left, 1980-1996-middle, and 1996-2014-right).

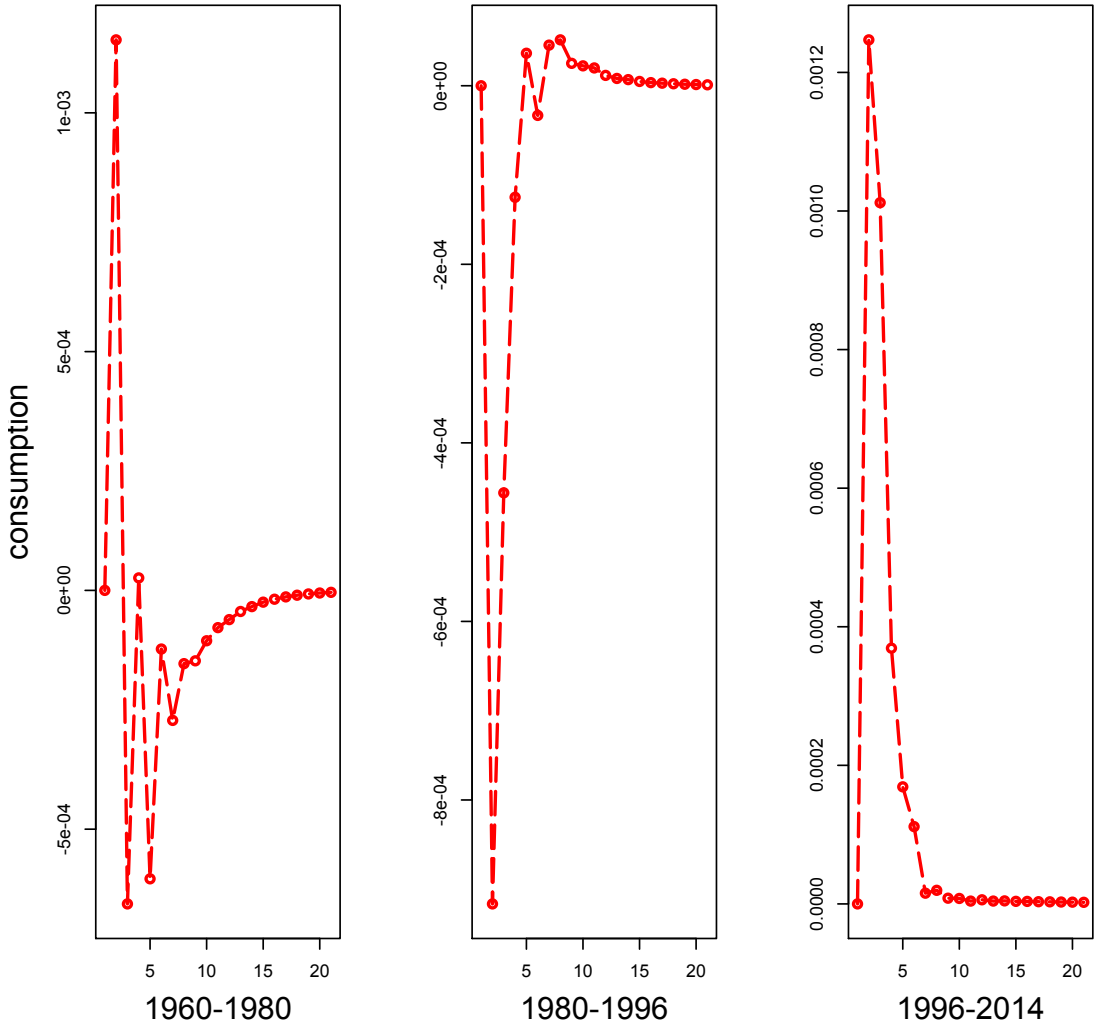

Figure 2.8. Impulse response from nonfinancial wealth upon consumption (1960-1980-left, 1980-1996-middle, and 1996-2014-right).

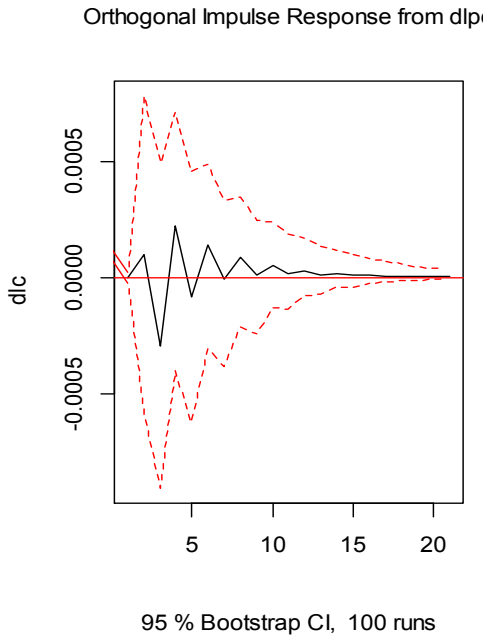

Figure 2.9. Impulse response of consumption to a private debt shock (whole period).

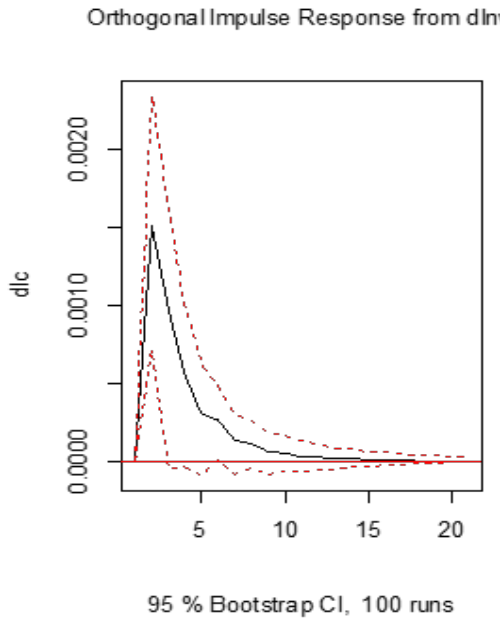

Figure 2.10. Impulse response of consumption to a net worth shock (whole period).

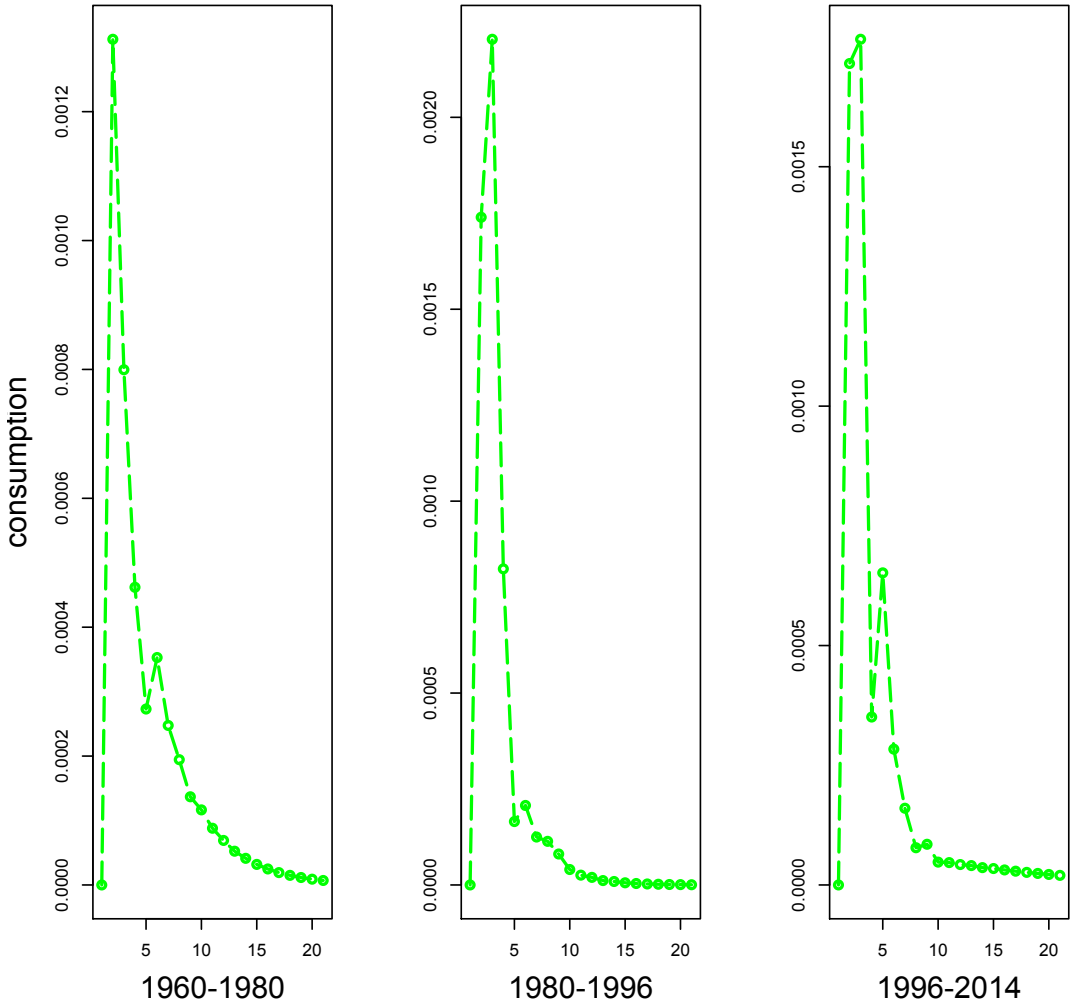

Figure 2.11. Impulse response from household net worth upon consumption (1960-1980-left, 1980-1996-middle, and 1996-2014-right).

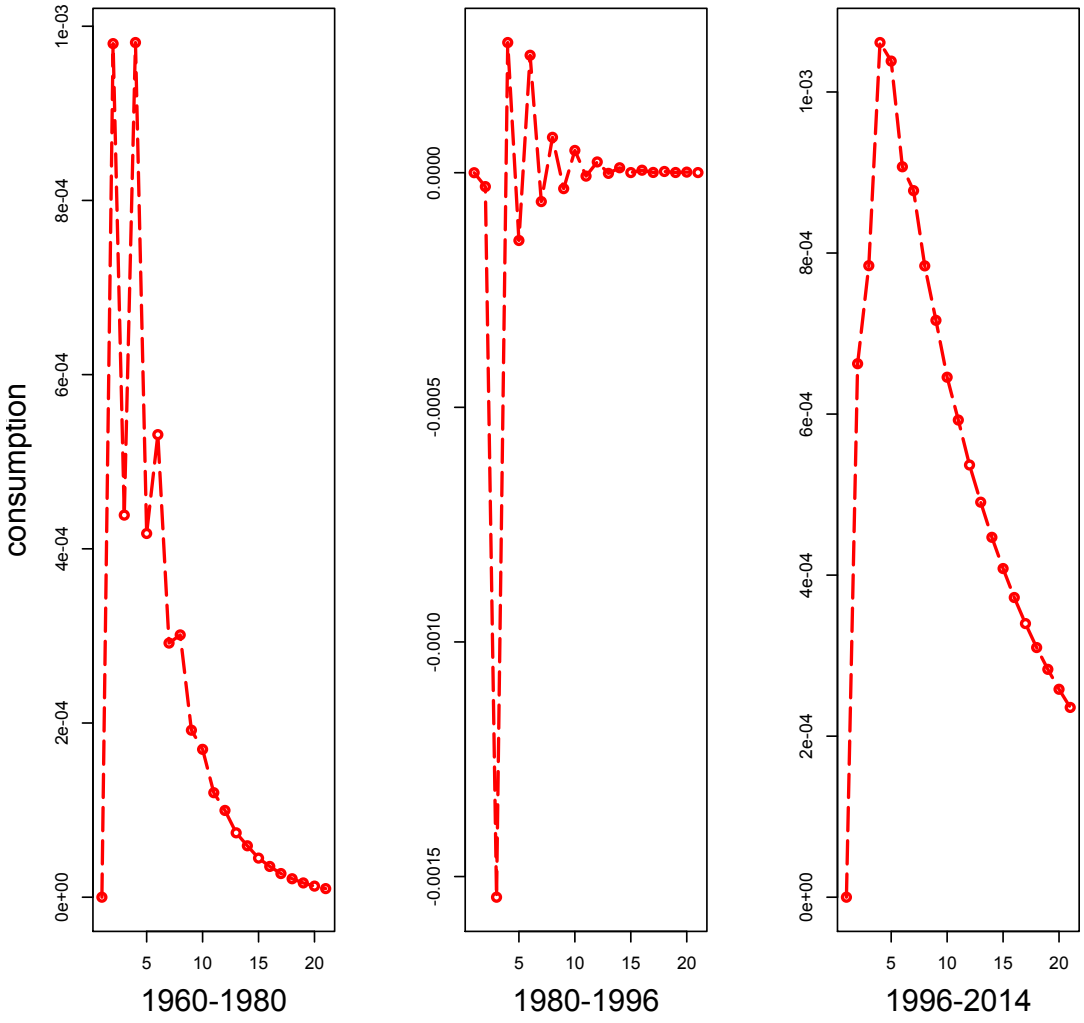

Figure 2.12. Impulse response from household debt upon consumption (1960-1980-left, 1980-1996-middle, and 1996-2014-right).

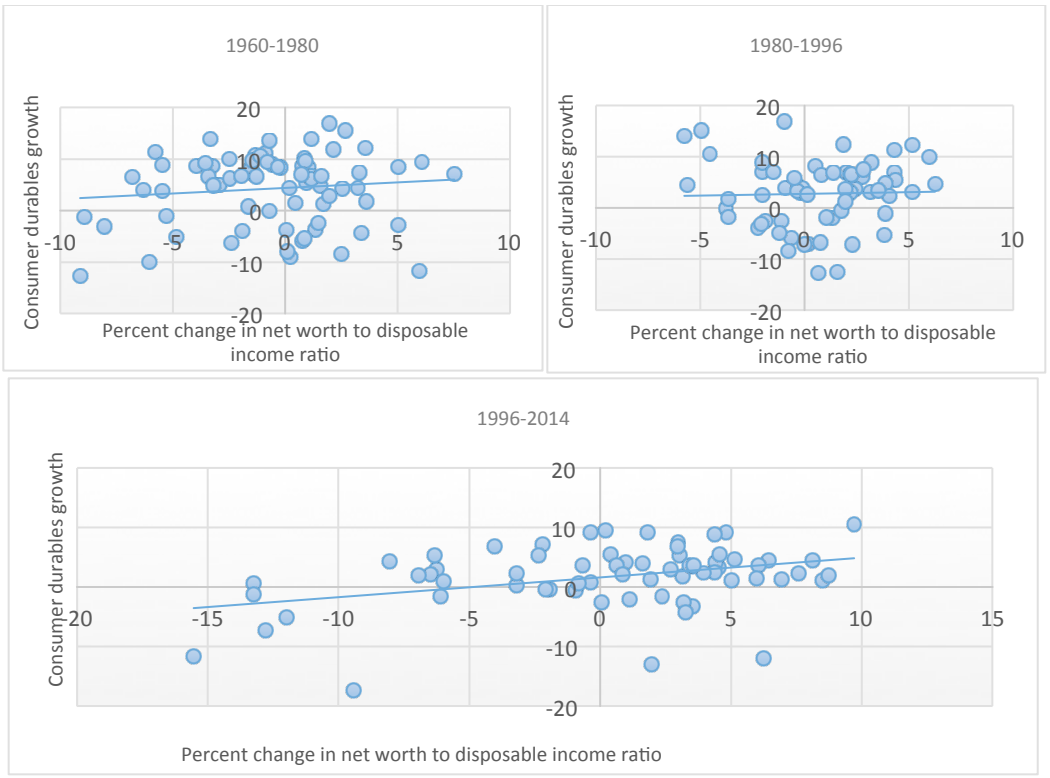

Figure 2.13. Three period analysis of consumer durable growth in relation to changes in household net worth to disposable income ratio.

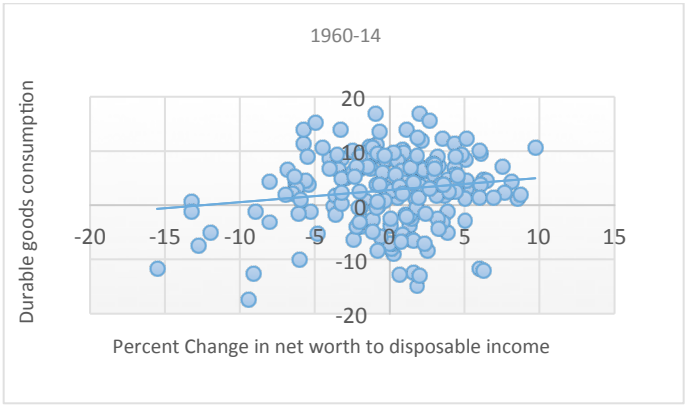

Figure 2.14. 1960-2014 consumer durable growth in relation to changes in household net worth to disposable income ratio.

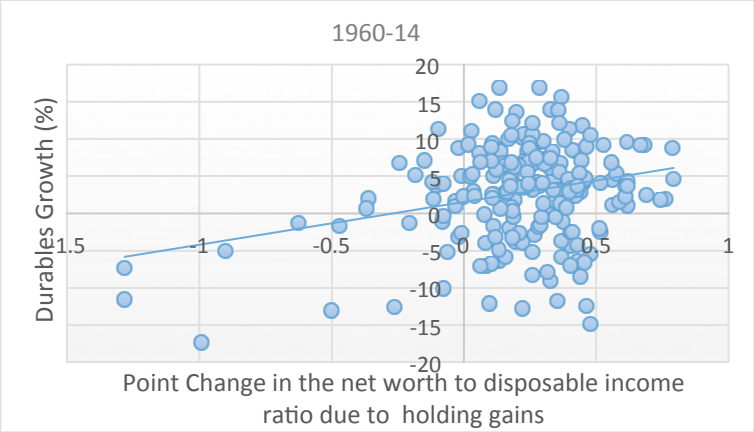

Figure 2.15. 1960-2014 analysis of consumer durable growth attributable to holding gains.

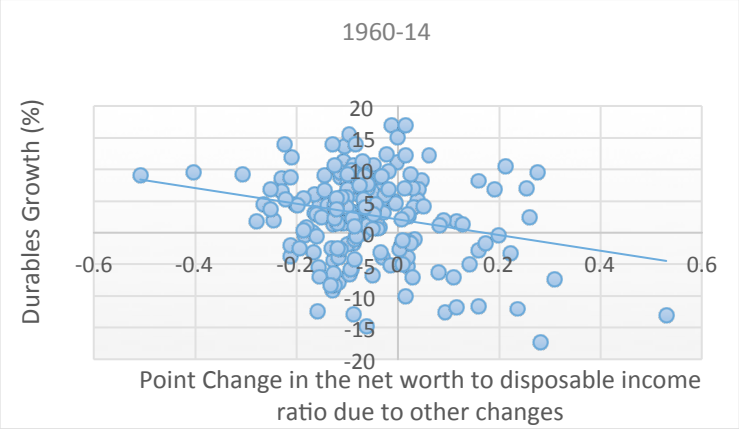

Figure 2.16. 1960-2014 analysis of consumer durable growth attributable to non-holding gains.

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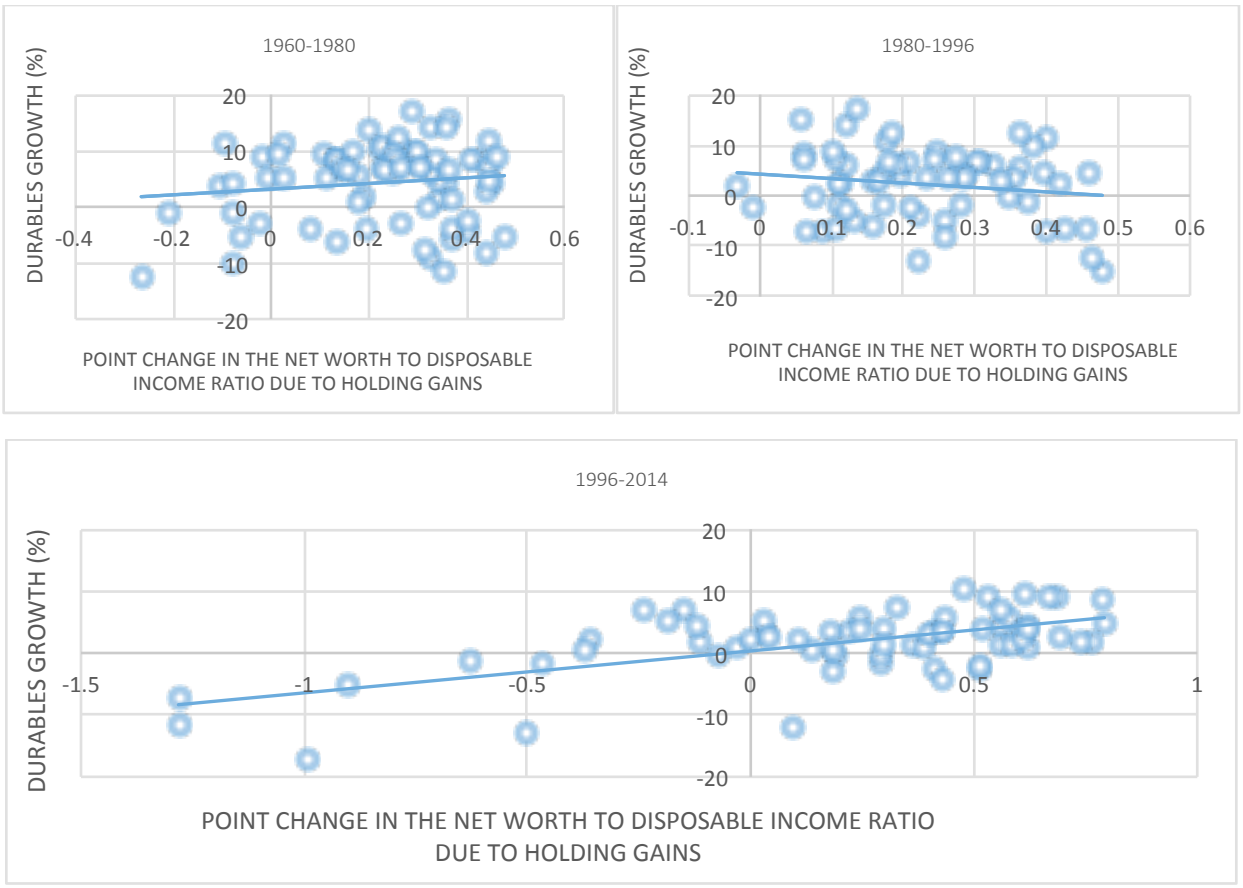

Figure 2.17. Three period analysis of consumer durable growth attributable to holding gains/losses.

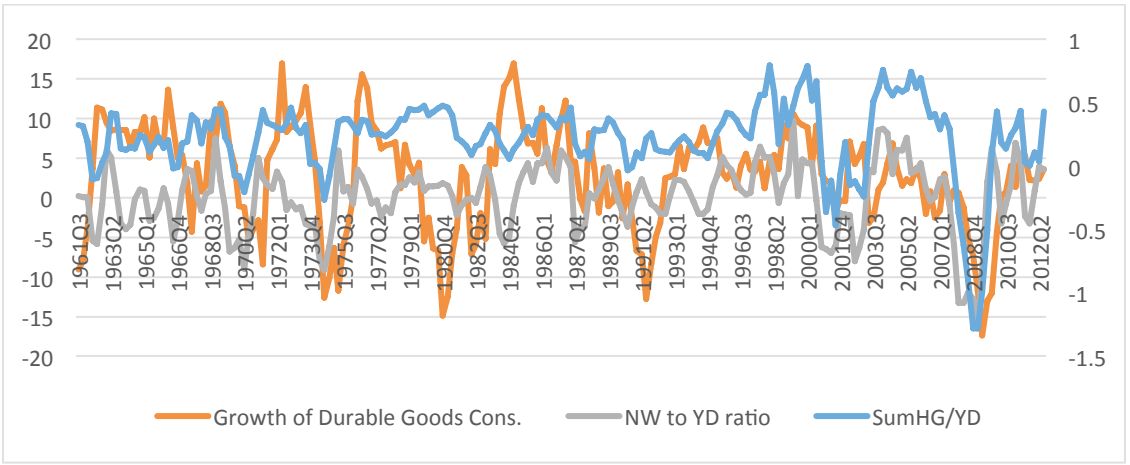

Figure 2.18. Durable goods growth (L) and NW (L) and HG (R).

Table 2.1. Augmented Dickey-Fuller Tests

ADF tests		
	Levels	In 1st Differences
lnPCE (2 lags, trend)	-2.05	-5.80***
lnLDY	1.83	-7.78***
lnNW	1.63	-6.12***
lnFA	1.76	-7.24***
lnNFA	1.60	-3.55**
lnPD	1.77	4.51***
***Indicates significance at the 99% level **Indicates significance at the 95% level		

Table 2.2. Johansen Cointegration Tests

Tests for consumption, disposable income, financial assets, and nonfinancial assets

	Test Statistics		**Critical Values**		
$\mathcal{H}_0$	$\rho = 3$	$\rho = 2$	90%	95%	99%
$r = 0$	69.21	68.59	59.14	62.99	70.05
$r = 1$	41.65	38.35	39.06	42.44	48.45
$r = 2$	18.19	13.81	22.76	25.32	30.45
$r = 3$	6.48	4.48	10.49	12.25	16.26

Tests for consumption, disposable income, private debt, and net worth

	Test Statistics		**Critical Values**		
$\mathcal{H}_0$	$\rho = 3$	$\rho = 2$	90%	95%	99%
$r = 0$	67.58	94.72	59.14	62.99	70.05
$r = 1$	30.75	17.66	39.06	42.44	48.45
$r = 2$	14.18	38.31	22.76	25.32	30.45
$r = 3$	6.08	8.02	10.49	12.25	16.26

Note: The table reports trace statistics for Johansen cointegration in relation to their critical values. The data are in levels and suggest the rejection of the null hypothesis of no cointegration at r=0 for both models.

Table 2.4 Variance Decomposition-Consumption, Financial Assets, and Nonfinancial Assets

	dlc	*dlyd*	*dlre*	*dlfa*
1960-2014	0.8843	0.0136	0.0294	0.0726
1960-1980	0.8757	0.0062	0.0246	0.0933
1980-1996	0.8122	0.0413	0.0174	0.1289
1996-2014	0.6853	0.0272	0.2139	0.0735

This table shows the percent variation in the row variable (10 periods ahead) explained by the column variable.

Table 2.5 Variance Decomposition-Consumption, Income, Net Worth, and Private Debt

	dlc	*dlyd*	*dlnw*	*dpd*
1960-2014	0.8968	0.0215	0.0762	0.0032
1960-1980	0.8657	0.0444	0.0445	0.0441
1980-1996	0.6745	0.0907	0.1811	0.0534
1996-2014	0.6632	0.0745	0.1344	0.1277

This table shows the percent variation in the row variable (10 periods ahead) explained by the column variable.

Table 2.6. Comparison of Change in Consumption due to Change in Net Worth Ratio and Holding Gains

	Pearson Correlations-	
Time Period	**Figure 2.13. Growth in Consumer Durables and Net Worth Ratio**	**Figure 2.16. Growth in Consumer Durable and Change in Net worth Ratio due to Holding Gains**
1960-2014	0.15	0.27
1960-1980	0.11	0.13
1980-1996	-0.01	0.12
1996-2014	0.37	0.61

Authors calculations from bea.gov

CHAPTER 3

ASSET PRICES, SAVING, AND CREDIT: MULTIDIRECTIONAL LINKS TO HOUSEHOLD NET WORTH

3.1. Introduction

This chapter connects three prominent macroeconomic financial trends of the past 30 years: the puzzling decline of U.S. saving, the steady increase in consumer expenditure, and the growth of aggregate household net worth. In Chapter 2, we presented an augmented consumption function, where spending is more responsive to changes in asset prices than to changes in household net worth. Here, in Chapter 3, we look at the components of household net worth in asset revaluation and net saving to discuss the manner in which their interaction influences the credit necessary to finance consumption. In contrast to traditional narratives of saving and net worth, we establish the increased importance of asset price inflation for credit but then show that the relation goes both ways, which is demonstrated through both descriptive statistics and Granger causality. A multidirectional link exists between asset prices and credit.

Traditional explanations of wealth focus on accumulated saving over time. However, net worth can also rise when the assets households hold appreciate. Economic consensus is that consumption growth was made possible by an increase in credit, and the credit expansion is commonly explained by increased levels of household net worth, which raises the question of what is behind the rise in household net worth and credit

when domestic flows of saving have declined.

Emerging in the 1990s, one school of thought has redefined saving to include asset price appreciation, which is consistent with the traditional explanation of wealth accumulation (Gale & Sablehaus, 1999; Poole, 2007). Positive asset revaluation influences household net worth, which allows further access to credit, both of which can occur without increasing saving. In connection to household spending, researchers (e.g., Bernanke, 2007; Bernanke, Gertler, & Gilchrist, 1999) have noted the role of collateral and wealth effects for amplifying shocks. Household net worth acts as the essential intermediary between asset prices and saving on the one side and credit financed spending on the other.

The trouble with the traditional perspective is that asset mispricing and the resulting financial crises are modeled as outliers or viewed as resulting from unexplained exogenous shocks. Rational agents view asset price inflation and its influence upon net worth as a supplement to saving. So long as net worth rises from asset appreciation, households can reduce their saving without any significant negative effects on the system. A reduction in liquidity or available credit from the falling rate of saving over the business cycle can be disregarded as agents with perfect foresight expect asset revaluation to raise their wealth and access to finance.

Typically, saving falls during a boom when household net worth is rising and surges in a contraction when wealth is declining. During times of falling saving, expenditures are increasingly financed, through access to credit, rather than current income, which in turn is made possible by the positive effect of asset appreciation on household net worth. In the revised view, asset price appreciation is treated as part of

saving, assuming implicitly that it reflects rational expectations about higher future incomes. This revision makes it possible to think of spending on credit as spending out of future income and saving. If the raised value of assets aligns with firm expectations of future profits and fundamentals, asset inflation can be treated as a part of future saving, reflected in the rise in net worth.

The problem with this view is that it ignores the direct and bi-directional influence of asset price shocks on credit (and expenditures) and asset mispricing (bubble dynamics) more generally. The alternative view, presented here, accounts for these cases, reporting evidence that credit expansion leads to rising net worth rather than the other way around. The alternative view is supported by the following facts: (a) asset price inflation is the primary driver of U.S. household net worth, (b) credit expansion is the main factor behind asset price appreciation, and (c) credit expansion has Granger- caused capital gains from the mid-1990s and onward.[23]

This chapter commences with an overview of U.S. data on saving and household net worth from 1960-2014. Section 3.3 summarizes explanations for the inverse relationship between household net worth and saving in connection to the rise of domestic credit. It also outlines the view that residual saving should include holding gains. Section 3.4 focuses on the relationship between credit and net worth and presents evidence that causation runs both ways rather than one way, as in the traditional view. The evidence on the relationship between holding gains and net worth is discussed first. Using Granger analysis, we show that whereas household net worth Granger predicts credit, more importantly in the latter period, credit Granger-causes holding gains. The

[23] Holding gains are the proxy and interchangeable term used in this chapter for asset price revaluation. Essentially, these are the capital gains from holding financial assets plus those from nonfinancial sources.

chapter concludes with a summary of related views on asset price expectations, credit, and bubble dynamics, especially following financial liberalization. The findings in this chapter parallel those of Chapter 2, where asset prices, credit, and their determinants have a stronger influence upon the real economy.[24]

3.2. Net Saving and Household Net Worth

Net saving is uniformly recognized and defined as the remainder from disposable income not consumed in the National Income and Product Accounts (NIPAs) and Integrated Macro Accounts (IMAs). A similar definition is found for personal saving rates in the Flow of Funds (FOF), where saving for a given year is the net acquisition of financial assets plus tangible capital, pensions, and insurance, subtracting both long- and short-term liabilities. Equation 3.1 visually presents both views, the left-hand side accounting for the FOF and the right-hand side the NIPA:

$$W_{t+1} - W_t = r_{t+1}W_t + Y_{t+1} - C_{t+1} \tag{3.1}$$

$$W_t = W_{(t-1)} + (YD_t\text{-}C) + CG \tag{3.2}$$

$$CG = \Delta pE * E_{t-1} + \Delta pHK * HK_{t-1} \tag{3.3}$$

where W_t is household net worth, r_t is the rate of return on accumulated assets (capital gains, dividends, or rents), Y_t is personal labor income, and C_t is current consumption. Taxes for both labor income and capital gains are omitted at this stage. If not for statistical discrepancy and distortions, the two measures should be equal.

[24] Chapter 2 finds that there is a tighter link between asset price change and consumer expenditure than that of spending to net worth. The latter is the conventional wealth effect. Saving is the difference between the two comparisons.

Both accounting measures have fallen precipitously over the previous two decades. The two forms also bring to light the difference between saving, restraint from spending, and a flow term and savings that are the cumulated stock of assets. Household wealth is composed of previous wealth plus net saving and the revaluation of existing assets; other factors such as volume changes are empirically small.

Equation 3.2 and 3.3 depict the traditional household wealth equation and expression of capital gains. Capital gains will be described as holding gains from this point on as a means of describing both financial gains ($\Delta pE * E_{t-1}$) and those from physical housing capital ($\Delta pHK * HK_{t-1}$). All variables in Equations 3.1 and 3.2 are real except $= r_{t+1}$, which reflects immediate but nominal gains or loss in asset values.

Figure 3.1 shows household net saving and net worth, both as a ratio to disposable income. Beginning in the 1980s, the two series drift apart as net saving falls and ceases to be the primary driver of the household sector's wealth. At the same time, realized and unrealized capital gains from financial and nonfinancial assets began to appreciate. The revaluation of existing assets (asset price inflation) appears to be responsible for changes in household net worth in the following periods. The net worth to disposable income ratio fluctuates around 4.5 between 1960 and 1990, peaking at 6.7 in 2007.[25] The raised levels of net worth ratio coincide with two major asset bubbles: the tech stock boom in the 1990s and the subprime-housing run that occurred in the 2000s.

The relationship among household assets, net saving, and net worth can be further analyzed within the IMAs. From traditional national accounting, net saving is unspent disposable income for a given period. Each sector's residual flows of saving are then

[25] A similar rise in wealth is shown if using household net worth to GDP, which historically ranges between 3 to 3.5, but rising to 4.5 to 5 in the mid-2000s.

accumulated towards its net worth. Following the steps of Yamashita (2013), Figure 3.2 is a scatter plot of household net saving and net worth ratios for the period 1960-2014. The data depict a slightly negative relationship between household net worth and the saving rate, mirroring the negative relationship depicted in Figure 3.1. The inverse relation between household saving and net worth differs from the common narrative of wealth accumulation, where growth in the former is expected to raise the latter.

Holding gains are the other key component of household net worth; these gains capture changes in asset prices over a period of time. Fundamentally, holding gains are capital gains from the revaluation of both financial assets such as corporate equities and nonfinancial assets in real estate. They also capture indirect assets such as mutual funds, pensions, and insurance contracts. Using the same period, 1960-2014, Figure 3.3 documents the close relationship between a change in household net worth and holding gains and that from net saving. The vertical axis measures the change in the net worth to disposable income ratio from one period to the next, and the horizontal axis shows holding gains or net saving for that period. Figure 3.2 and Figure 3.3 demonstrate that the increase in aggregate household wealth occurs from price change rather than quantity effects.

3.3. Explanations of the Inverse Relation Between Saving and Net Worth

The inverse relation between household net worth and saving brings into question whether household saving is necessary for wealth accumulation or for growth in collateral values.[26] Even with the shrinking household saving ratio, both net worth and

[26] One explanation emphasizes net borrowing or the flow of international savings into the US as outlined in Ben Bernanke's 'global saving glut' (Bernanke, 2005). Bernanke's famed 'saving glut' outlines how excess

credit in the US have grown drastically. In response, the traditional view of saving has been supplemented, beyond tracking the residual form. In questioning the measurement of domestic saving, one strand of research suggests that household net worth itself may act as a form of saving for Gale, Sabelhaus, and Hall (1999) and Pollin (1997).[27] Clearly, net worth itself is a stock variable whereas saving is a flow variable. However, the essential point is that growing household net worth acts as an intermediary for credit even as flows of saving in relation to income shrink.

The saving, net worth anomaly is dealt with by introducing a 'broader view of saving' that includes gains in net worth from financial assets.[28] When saving is redefined to incorporate increases in net worth, the falling trend of the past three decades disappears, as shown in Figure 3.4. For instance, Gale et al. (1999) add changes in equities prices and other forms of capital revaluation to their definition of saving. Using a

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foreign saving has influenced U.S. credit conditions (Bernanke, 2007). During the mid-2000s, inflowing funds from the rest of the world purchased long-term U.S. financial assets. The net saving from the rest of the world made up for declining U.S. saving and pushed long-term interest rates down even as the Fed tried to raise them. Capital flows into the US propped up the dollar while allowing for 'liquidity trap' conditions (Krugman, Dominquez, & Rogoff, 1998). Bernanke's general conclusion is that excess saving resulted from an expansion in global funds in comparison to available global investment. In the US, capital account surpluses allowed for the persistent and expanding trade deficits, 6% of GDP at its peak. However, the 'saving glut' narrative may in fact be a story of global demand deficiency or a lack of investment opportunities. In search of safety, U.S. capital markets, and later real estate, provided a haven for foreign funds. Following these assumptions, the Great Recession resulted from an inability of the US to continue intermediating longer-term foreign saving with its own short-term foreign investment (D'Arista & Erturk, 2010). Rather, credit stayed within the US, thereby creating conditions for the housing bubble. Though essential to any narrative of U.S. credit conditions in the mid-2000s, we forego any additional discussion of international influences upon credit for the present. However, the influence of foreign saving, whether from Bernanke's glut in foreign saving or from a deficiency in global investment, fits well in either perspective on saving. The rise in U.S. financial asset purchases from the foreign sector inflates existing assets and props up net worth.

[27] Yet a third explanation why financial markets were not adversely affected by lower saving can be that gross saving might have had a trend different from that of net saving. However, the difference between gross and net saving is simply depreciation, and there is no evidence that depreciation has significantly increased in the last couple of decades.

[28] Other means of explaining the discrepancy and the downward bias of saving are (a) treating consumer durables as a form of household investment, (b) the exclusion of pension benefits as a part of disposable income, and (c) the repurchase of stock shares as opposed to dividend distribution as a means of profit sharing. Each critique suggests that the NIPA measure of saving is an underestimate (Guidolin & La Jeunesse, 2007).

broader metric demonstrates that capital gains accounted for 80% of gains in household net worth between 1995-1998 and were 10 times the measured net saving in 1997 and 1998. Data from the IMAs confirm this finding for subsequent periods, as shown in Figure 3.4 and Figure 3.5. Variation in holding gains not normalized by disposable income largely overshadows those in net saving. The more formal measure considers the ratio of wealth change from the FOF definition or that remaining from disposable income in the NIPAs. The inclusion of holding gains to saving alters from 5% of disposable income in 1960-1994 to 7.4% from 1994-2006 (Guidolin & La Jeunesse, 2007). Under the broader view, omitting capital gains from the NIPA measure underestimates saving (Poole, 2007).[29]

Rising household net worth from asset appreciation supplements the traditional explanation of saving. The raised level of wealth ratios permits further access to credit from the simultaneous rise in collateral values.[30] Raised levels of liquidity permit steady expenditure in the face of falling net saving. The connection between firm net worth and internal finance and their interrelationship to credit access and investment are well developed (Bernanke et al., 1999; Fazzari & Petersen, 1993). Some recent studies of household consumption add the connection of net worth and credit, primarily focusing on the 'wealth' and 'collateral' effects, whereas other studies elaborate on the role of asset

[29] Not all economists are advocates of the broader approach to saving. Many take issue with the addition of capital gains to saving as unrealized gains represent a return to previous saving. Also appreciation itself does not create new productive capital stock and may be more indicative of mispricing (Guidon & LaJeunesse, 2007; Poole, 2007).

[30] A critique of traditional views of household saving being transferred to business is provided by Ruggles and Ruggles (Nancy & Ruggles, 1992; Ruggles, 1993). Their work creates more accurate measures of both business and household saving and investment from 1947-1989, contradicting much of the prominent macroeconomic literature on saving and investment. The Ruggles find that for households, gross saving does not exceed investment in its own capital formation in amounts adequate to provide significant net lending even prior to the neoliberal age. For the enterprise sector as a whole, gross saving has been greater than or equal to capital formation. The implication is that the household sector has not been a net provider of saving of funds that flow to enterprise investment. Instead, businesses have been able to cover their own capital formation. Chapter 4 adds to this discussion.

prices and leverage (Mian & Sufi, 2014).[31]

Figure 3.5 provides an additional view of saving and asset revaluation that highlights cyclical changes after 1960. The top portion of the figure shows the change in holding gains, and net household saving is depicted below. Holding gains quickly turn to losses during recessions, as can be seen with the addition of the National Bureau of Economic Research recession bars. Large price changes can be seen from both the stock bubble of the 1990s and the housing bubble of the 2000s. Net saving to income has grown during each of the past slumps, though the downward trend began in the early 1980s.[32] Both series are normalized to disposable income to show 50 years of behavior over the cycle.

Arguably, the effort to incorporate asset price appreciation in saving stems from conflating finance with available saving. The textbook macroeconomic identity of investment and saving is based on the idea that the sum of unspent residual income in each sector is what finances investment in the aggregate. The implication is that for investment to occur, actual money balances from unspent income need to be made available to finance it. Available saving is then intermediated by the banking sector toward financing capital acquisition and production.

However, finance refers to "access to purchasing power in the form of an accepted settlement medium (money), including through borrowing. Saving, as defined in

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[31] Using net wealth accumulation as a measure of saving and its impact upon the cycle reemerged in the mid-1990s. Still, differences remain in the purpose and meaning of net worth to disposable income. For instance, Post-Keynesians such as Moore (1979) redefine saving in a manner as to exhibit saving as merely the accounting record of investment. Following this line of thought keeps the identity, where investment is always equal to savings *ex post* in the national accounts. The identity is a historically created "record of saving that has already been accomplished, and therefore by definition must have been matched by investment" (Palley, 1996, p. 7).

[32] As shown in Chapter 2, the fall in the saving rate is in response to stagnant incomes with steady consumer expenditure, a feature challenging traditional theories of consumption.

the national accounts, is simply income (output) not consumed, … In fact, the link between saving and credit is very loose" (Borio, 2014, p. 16). An increasingly complex domestic and international financial structure has altered the former relation between saving and finance; low saving as defined by the NIPAs does not constrain credit (Pollin, 1997). Bank credit is no longer dependent upon one party abstaining from spending as in the traditional loanable funds narrative. Clearly, saving can influence finance, though it is by no means the only crucial factor. Planned expenditure-- whether investment or consumption-- requires finance, rather than a pool of saved funds.

Wealth and credit growth from capital gains support the appended form of saving. In addition, credit from rising collateral values fits within the well-known macroeconomic financial arguments of rational expectations. Rational and forward-looking agents, who expect profitability in their portfolios, view financial gains as a broader form of saving. From this perspective, household dissaving and asset price appreciation since the 1980s are complementary. The rationality of forward-looking players is consistent with the stringent assumptions involved in the efficient market hypothesis where financial prices reflect *fundamental* values based on rational profit expectations. If assets are always priced "correctly," then asset price revaluation reflects changes in expected future profits and income.

3.4. An Alternate View: The Multidirectional Link Between Household Net Worth and Credit

The closer empirical connection between holding gains and consumption than that between net worth to consumption, presented in Chapter 2, suggests asset revaluation is the driving influence behind household net worth. In fact, it can be argued that credit

expansion is the causal variable behind net worth rather than the other way around. Many researchers have made the argument that household net worth has acted as collateral, supplementing saving, which has allowed increased access to credit. However, there is ample evidence to suggest that credit and lending behaviors have also acted to prop up household net worth through an influence upon asset prices, as clearly was the case in the most recent wave of financial liberalization. The unrestricted rise of credit has a bi-directional link to asset values. Finance in recent decades has itself become a function of optimistic future asset price expectations.

Figure 3.6 summarizes the two views presented in this chapter. The upper portion describes the traditional though supplemented account of saving and net worth. An explanation for the inverse relationship between the two, also shown Figure 3.2, is based on the argument that the relationship is simply an artificial effect from excluding asset price revaluation in household saving. Agents with rational expectations view financial holding gains as a reflection of profit conditions in the real sector, permitting the decline in saving while maintaining net worth. If the growth of asset prices is in line with fundamental values, the prices can be thought of as part of future saving, which the measured increase in their net worth reflects. Household wealth becomes the intermediary, allowing for credit, which further impacts expenditure through wealth or collateral effects.

The lower portion of Figure 3.6 presents the alternative view argued here, which emphasizes the mutually reinforcing relationship between asset prices and credit. Rather than asset prices as a complement to saving, this view holds that the link between credit and asset values is stronger than that of credit to net worth. This distinction is important

for three reasons: first, it explains and supports the view that asset mispricing is pervasive, with real macroeconomic effects. Second, asset price expectations may have more to do with their own dynamics rather than changes in any *fundamentals*. Finally, the very changes in behavior that are discussed here support the view that financial innovation and deregulation have altered macrorelationships that were formerly considered stable stylized facts.

The alternative view is supported by the following observations since the mid-1990s: (a) asset price inflation has been the primary driver of U.S. household net worth, (b) credit expansion has been the main factor behind asset price appreciation, and (c) the expansion of credit Granger-causes holding gains that account for the rise in net worth following 1996. Points (a) and (b) have growing theoretical and empirical support, though they are rarely linked to larger macroeconomic outcomes.[33] With subsequent changes to the domestic and international financial structure, credit and asset price expectations may have as significant an influence upon their own trajectory as that from "real" variables. Saving, even that which is supplemented by net worth, appears to be the result rather than the cause of credit and asset price growth. To analyze these phenomena, Granger causality from an estimated VAR is employed.

The view taken here that asset prices drive household net worth rather than accumulated saving, shown in Sections 3.2 and 3.3, is not unique. Research in the 1990s emphasized the manner in which asset price inflation raised net worth, thereby allowing further access to credit for both firms and households (Bernanke, 2007; Fazzari, 1993). In highlighting the importance of internal finance and net worth, this literature creates a

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[33] For example, see Piketty and Zucman, (2013), Bernanke (2007), or Fazzari (1993). Each describes a manner in which asset inflation raises net worth levels, without reconnecting this to broader macrotrends.

'work around' for the decline in household saving with steady expenditure. However, the traditional view where asset price-driven net worth acts as an appendage to saving may still function within their account of credit supply.

The recent focus on wealth inequality further demonstrates the causal role of asset appreciation. For instance, historical macrofinancial data for advanced nations show wealth to income ratios rising over the past four decades from price rather than quantity effects (Piketty & Zucman, 2013). Even at the global stage, the rise of wealth ratios is from asset inflation. However, either of the viewpoints compared in this chapter, the net worth channel or the asset price-credit link, can use the fact that net worth is driven by holding gains.

The divergence between the two narratives begins with point (b); credit expansion has been the main factor behind rising asset values. Various efforts have been made to connect asset price changes with financial conditions (Adrian & Shin, 2009; Bernanke, 2007; Panetta et al., 2009; Taylor, 2012), and these researchers have emphasized that the growth of credit has had a strong influence on asset prices after the mid-1980s. Researchers who have picked up on the 'link' depict this interaction as a financial cycle, which is characterized by a co-movement between credit and asset values (Borio, 2012).[34]

Also supportive of the alternative view is the fact that the financial cycle has grown in magnitude with each cycle. In connection with deregulation, globalization, and monetary policy, asset prices are becoming more responsive to credit growth. The

[34] Borio is critical of the mainstream economic literature, which has failed to learn the lessons from Minsky (1986) and Kindleberger and Aliber (2011). Instead, neoclassical authors favor macroeconomic models focused on frictions, or exogenous shocks fit into dynamic stochastic general equilibrium models. In even more progressive variations, such as Bernanke's work on the Financial Accelerator, the cycle only enhances shocks before returning to some natural or steady state (Bernanke, Gertler, & Gilchrist, 1999).

association between the two variables strengthened after 1985 and has been observed for 18 leading nations (Drehmann, Borio, & Tsatsaronis, 2012; Goodhart & Hofmann, 2008). Our results mirror those from the financial cycle literature, showing that the connection tightens in progressive stages of financial liberalization, specifically after 1996.

The level of credit also becomes increasingly important in the prediction of asset price booms and busts. With the data from 18 Organization for Economic Co-operation and Development (OECD) countries, credit and monetary aggregates are associated with an asset market boom four quarters out and bust up to eight quarters ahead (Gerdesmeir, Reimers, & Roffia, 2009). In measuring the percentage of trend deviation when compared to asset prices, monetary aggregates, and an investment gap, credit is also the best indicator for future crises (Borio & Lowe, 2004). A signaling approach provides a similar result, as a warning binary sign indicates reaching dangerous thresholds, in this case suggesting both high and low cost asset bubbles (Alessi & Detkin, 2009). Global liquidity is the best predictor of costly asset price busts reinforcing the alternative argument. Credit is the major determinant behind asset values and thus a sector's net worth.

The close connection between credit and asset prices can be attributed to the similar response each has to monetary policy. Expansionary monetary policy in the form of reductions in interest rates, increasing the size of the Central Bank's balance sheet, or verbally forming positive expectations, generally raises credit and asset prices (Bernanke & Rienhart 2004; Posen 2010). If the policy is too accommodating, the boom may turn into bubble conditions when excessive asset prices collapse. In addition, monetary policy amplifies the many self-reinforcing links between credit and asset prices.

To illustrate the dynamic and multidirectional link between credit and asset price revaluation, point (c), Granger causality is utilized based upon an estimated vector autoregression.[35] Again, all data are obtained from the National Income and Product Accounts and Integrated Macro Accounts. In line with contemporary literature, additional real and financial variables, net worth, and consumer spending are also analyzed for the US. To proxy credit, credit to the private nonfinancial sector is used, though similar results are found for other credit indicators. Holding gains are the national accounting term for nominal changes in asset prices gained by the owner. This term should be read interchangeably with asset price revaluation. For holding gains and household net worth, we use the values from the IMAs in Section 3.3, which date further back than that of the aforementioned sources. Our method provides both a long- and shorter-period analysis of each two-variable interaction. Each variable is real, expressed in logs, and differenced, following stationarity tests.[36] Stationarity is ensured with the use of logs and first differences alterations and is shown in Table 3.1 with Augmented Dickey Fuller (ADF) tests. Finally, the value of lag *K* is determined at 2 using the Bayesian (BIC) and Akaike Information Criteria (AIC).

Granger causality tests provide a method to evaluate the ability of a variable to forecast the path of another variable. Causality is tested with *F*-tests as to whether the

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[35] Vector autoregressions (VARs) are useful as they explain each variable from its own lagged values and that of the other *n-1* variables used within the model. All relationships are analyzed. Bivariate VARs and Granger causality are utilized in this chapter to capture the behavior and predictive ability of each variable and its lags upon other variables. Reduced-form VAR models capture the interrelated behavior for each of the variables from 1960-2014. A reduced-form VAR is specified by $X_t = B_0 + \sum_{k=1}^{K} B_k X_{t-k} + E_t$. Now *X* acts as the vector of variables credit, net worth, holding gains, consumption, and money supply *(Cr, NW, HG, Con)*. Three equations for each X_i are created where B_k is the matrix of coefficients for the *k*th lag of X_t, and E_t is the vector of reduced-form innovations. As outlined in Chapter 2, VARs are advantageous in their treatment of all variables as endogenous.

[36] This is the approach taken by Borio (2012) and Drehmann et al. (2012). In contrast, the series presented by Goodhart et al. (2008) are nominal except in logs and differenced. We have utilized both with the IMA data and have found similar results.

lagged values for one variable are able to provide useful and statistically significant information about another variable with its own lags. If so, the former variable can be said to Granger-cause the latter. Determination of the usefulness for predicting or forecasting is subject to assumptions, the lag length, and the stationarity of the variables. Stationarity has been ensured, but each statistically significant relationship found in Table 3.2 has also been tested and confirmed at multiple lag lengths. The following results align with international findings on an array of real and financial variables (Goodhart & Hoffmann, 2008).

Table 3.2 looks at the Granger interaction for four variables for the whole period beginning in 1960-2014 and the subperiod 1996-2014.The latter period highlights the third and progressive stage of financial liberalization. As expected, many of the relationships analyzed returned similar Granger causality results for both periods. The table reports *F*-test statistics for Granger causality where significant test statistics are shown in bold and *P*-values are below in parenthesis. Each interaction demonstrates one variable's ability to Granger-cause another.

Technically, *F*-tests and statistics give the probability or likelihood of each compared relationship. Clearly, a higher *F*-statistic is more probable than a lower statistic, implying that one variable x_t occurs prior to and provides useful forecasting information for another y_{t+1}. Statistically significant and high *F*-statistics do not imply that the model will occur, only that it is more likely. Although it is well established that Granger causality does not capture all facets of causality, enough remain to be considered as a useful empirical test (Granger, 2001).

Nonetheless, Granger causality or likelihood is a pragmatic method for analyzing

direct interaction between two variables in both the full period (1960-2014) and subperiod (1996-2014). Beginning with the whole period, the second grouping of rows in Table 3.2 highlights the usefulness of net worth (*nw*) in predicting credit (*cr)*, holding gains (*hg*), and consumption (*con*). Net worth can be said to Granger-cause both credit ($\Delta nw \rightarrow \Delta cr$) and holding gains ($\Delta nw \rightarrow \Delta hg$) but not consumption ($\Delta nw \rightarrow \Delta con$) for the entire period. Taken alone, these results can align with the traditional view that household net worth supplements the traditional form of saving, which allows for increased credit but also expenditure.

However, the altered behavior of the third subperiod suggests that the alternative view is more robust. The multidirectional link is expressed as asset values Granger-caused credit ($\Delta hg \rightarrow \Delta cr$). More importantly, credit Granger-causes asset price change. In an analysis of the whole period, credit fails to predict holding gains. Nevertheless, when looking at the period following 1996, credit is now a predictor of asset price gains and thus indirectly household net worth. Credit influencing holding gains in the latter era but not the entire period suggests that the macroeconomic financial interaction has changed. The change supports the assessment that credit has become a key component of household net worth. The direct relationship between credit and net worth is drowned by the behavior of saving, which runs converse to both over the cycle.

The asset price change-net worth link and credit-net worth connection are both firmly established. That credit now causes net worth suggests that it may also influence residual saving as well.[37] Figure 3.6 depicts this tenuous connection with dashed arrows. In the third period of financial liberalization, rather than one-way causation, credit and

[37] International Granger causality tests from Goodhart and Hoffman (2008) find the link between credit and net worth to be stronger after 1985.

asset prices mutually reinforce each other. As with the dynamics of consumption and asset price changes from Chapter 2, credit and asset inflation are more tightly linked than credit to net worth. The closer connection of both credit and consumption to asset values supports the alternative view. Credit is as much its own driver and thus relies less upon saving or net worth-saving.

3.5. Feedbacks, Expectations, Bubbles, and Credit Dynamics

The stronger link between asset prices and credit after 1996 renders the traditional view less plausible, while lending support to the alternative view argued here, which is also in alignment with a growing literature on asset price feedbacks, expectations, bubbles, and credit dynamics. These accounts portray a less sanguine perspective of modern financial capitalism than what is found in traditional macroeconomics, which takes the self-correcting ability of financial asset prices as a given.

The suggestion that excessive credit and asset price speculation are causal to mispricing and bubbles challenges core economic tenets such as rational expectations from forward looking agents. For instance, the efficient market hypothesis (EMH), the dominant view among economists until the Great Recession, suggests that financial markets price assets in such a way that they correctly assess information and provide optimal forecasts (Fama, 1970). Asset prices are merely a reflection of shifts in the issuing firm's profitability given the technology of the industry. Neither asset price bubbles nor financial instability due to speculation are possible if capital markets are working correctly.

The EMH builds upon Milton Friedman's argument that asset price speculation is

stabilizing, and therefore prices portray a true value (1953). For instance, if an asset became overvalued, smarter market participants would short it, which would bring its price back into line with fundamentals. Price arbitrage from smart traders made destabilizing speculation both unprofitable and unlikely in the long run. Therefore, any sustained increases in asset prices were attributed to the fundamentals of supply and demand and reflected the objective earning potential of firms. Asset prices and the balance sheets they influence can then be disregarded as having little impact upon economic performance.

In the face of declining saving and asset appreciation in the 1980s, the traditional view of saving softened its stance by allowing net worth from asset revaluation to influence credit. Nonetheless, this view still relied upon rational, forward-looking agents who could afford to reduce saving as net worth was propped up. Financial assets enabled household and firms to transfer purchasing power from future profits to the present. Their saving included both realized and unrealized capital gains. Financing and credit from increased levels of net worth could then explain continued investment and consumer expenditure. Net worth as an appendage to the traditional form of saving falls in line with standard perspectives where asset mispricing is nonexistent.

The direct credit-asset price link questions net worth as a supplement to saving or the view that it acts as an essential intermediary for liquidity. Net worth-saving relies upon the assumption that assets are priced correctly and tied to fundamental values. The well-chronicled history of financial bubbles suggests that financial sentiment and herd behavior are also important to asset pricing. Financial crises also question agents' foresight and rationality where these have less to do with the decision of U.S. households

to reduce saving over the past 30 years.

Instead, the two-way interaction and determination of asset prices and credit have also become a function of expectations and uncertainty. Fundamentals remain an important variable, but they diverge from actual or even expected prices from the optimistic/pessimistic views of market participants. Asset price speculation, where a security is purchased at a price above its fundamental value with the intent to sell it at a higher price in the future, has real effects if it influences views about objective values. Expectations influence current prices, which alter the fundamental value of financial assets-- a challenge to the EMH view where arbitrage aligns market prices with fundamentals.

The limitations of arbitrage are also critiqued by behavioral finance. In the time span required to short a security, an assets price may become even more overpriced or the true value could even rise. If either occurs, a short position proves unprofitable. In such scenarios, smart traders minimize their positions or even react to the noise for an additional period. Under boom conditions, smart money investors are unable to counteract the 'animal spirits' of ordinary investors (Shiller, 2015). Rather than stabilizing speculation, speculative agents profitably drive prices away from fundamentals. In line with Keynes's (1936) beauty contest analogy, price expectations are built upon both the expected true value of an asset and the average weighted opinion of other agents and what they believe the true value to be.

Asset price speculation plays a far more important role in Keynes's *Treatise on Money* than in his later *The General Theory*.[38] Keynes divides the cycle into periods of

[38] Beyond a few quotes involving 'casino capitalism' and 'productive capacity as a bubble on a stream of speculation,' *The General Theory* downplays the importance of asset price speculation to highlight other

bull and bear market mentality of financial market participants. Future expectations for asset prices and profits motivate investors' speculative behavior. Likewise, the extension of credit from lenders resulted from their own expectation of the future, proxied by asset prices, rather than accumulated saving in the form of deposits. The cycle was broken up into four stages to explain how speculative financial sentiment could alter credit, asset prices, and spending (1930).

The first stage describes a bull market with consensus of opinion where all agents (firms, investors) expect asset prices and profits to rise. During the early period, expectations are confirmed, leading to further profit optimism and speculation. Positive expectations cause agents to change the composition of their balance sheets in favor of yield, while also reducing liquidity preference. The second part of the expansion is still described as a bull market, though with a division of opinion. Market participants no longer agree on the direction of asset prices and firm profits. Still, funds are transferred from the pessimistic to those who remain bullish. The bulls continue to invest, driving prices higher. Output and transaction demand for money also rise, but the banking sector can accommodate these needs as long as prices rise. Even for Keynes, who focused on monetary circulation, residual saving was not a constraint to the banking sector's ability to meet credit needs (Erturk, 2006; Keynes, 1930).

The collapse occurs when a greater segment of the market views asset prices as out of line with fundamental values. A bear market with consensus of opinion takes hold, and prices and profits begin to fall. As the market becomes overvalued, the demand for narrow money grows while its supply diminishes. As prices are expected to continue

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elements of the Keynesian agenda. Erturk (2005, 2006) elaborates upon the important differences and reasoning for the omissions.

falling, the banking sector finds it more difficult to offer sufficient credit.

Keynes's work on asset prices paints a far different picture for mispricing and volatility than that of his successors. In the neoliberal era, financial assets and wealth ratios are no longer stationary. Since the 1980s, agents have exhibited what Keynes referred to as a declining 'bear position,' associated with declining household saving, dishoarding, and increasing responsiveness to asset prices. Higher asset prices and increasingly bullish sentiment created an environment where the banking system could be far more accommodating to the growth of output in spite of shrinking household saving. At odds with orthodox finance, prices are not always aligned with fundamentals. Similarly, physical saving need not match the supply of finance. Both phenomena are likely to change over the cycle.

The interdependence among actual, expected, and fundamental values has been referred to as 'reflexivity.' The theory outlines how investors' beliefs about markets efficiency change the way they invest, which then changes the nature of the markets (Soros, 2015). In contrast to the EMH, asset price expectations can alter outcomes as they influence future earnings. A change in perceived profitability alters the market price, both of which have a significant influence upon the perception of fundamentals. The process creates self-reinforcing or defeating feedback loops. For instance, "Negative feedback brings the participants' views and the actual situation closer together; positive feedback drives them further apart" (Soros, 2013, p. 322). As with Keynes, positive feedback or optimistic asset price expectations cannot rise forever; eventually, bearish sentiment takes hold. In either scenario, market prices gravitate around fundamentals and trends but are

not always in line or self-correcting.[39]

Bubbles in asset values occur when prices positively deviate from the trend and discounted expectations of future profits. Bubbles arise from positive feedbacks and are driven by investor enthusiasm, which leads to further price gains. Although the existence of bubbles is disputed by EMH proponents (Fama, 1970), financial liberalization and deregulation emerging in the 1980s have made these phenomena more prevalent within the U.S. economy. Shiller suggests three bubble ages in the neoliberal era: the Millennium boom, the Ownership Society boom, and the New Normal boom (Shiller, 2015). Asset price bubbles are both the cause and result of credit growth and the fall in net saving.

Reflexivity and bubbles go hand in hand. Soros uses the example of the real estate boom and its interaction with credit. Cheaper credit allows increased home purchases, which drives up prices; both fall with a bust (Soros, 2014). The easy credit feedback occurs for stock prices as well, raising levels of wealth and spending, which further raise stock prices. The repurchase of stock, a form of firm saving, has a similar effect upon price growth. The capital gains realized or not influence household wealth. However, credit, like asset prices, has also become a function of its own inertia and financial sentiment beyond simple wealth or collateral effects. Expected increases in real activity and credit conditions influence actual lending behavior from financial intermediaries. The rise in anticipated liquidity can itself stimulate asset prices and

[39] Earnings per share are one proxy for fundamentals and a means to view the deviance from the trend. Securities prices diverge from earnings during a positive feedback period but realign with the bust. Shiller (2015) prefers to use a 10-year moving average in his cyclically adjusted PE ratio (CAPE) for the Standard and Poor's 500 index. CAPE or the simple comparison between real S&P 500 index in relation to earnings per share shows peaks in 1929, 2000, and 2007 are suggestive of periods in which assets grew prior to financial collapse.

further spending and then prices.

Lending from financial intermediaries is yet another example where the asset price-credit link has been altered in recent decades. Credit has increasingly come from nonbank sources whose lending decisions are more tied to asset price volatility than are those of traditional banks. Essentially, this is an extension of Soros's reflexivity, which now connects the growth assets of nonbank intermediaries and credit response. The influence of capital markets upon credit funding has become increasingly positive. The change has occurred with the rise of market-based institutions that now hold mortgage-related assets in excess of those from traditional banks. As broker-dealer intermediaries are more responsive to asset price changes and are holding shorter-term claims, "their importance in the supply of credit has increased in step with securitization" (Adrian & Shin, 2009, p. 600). Changes in leverage and the positive response in an intermediaries' balance sheet size demonstrate the active management of one's own equity. Leverage is managed by expanding or contracting the balance sheet instead of offering equity payouts. The purchase of mortgages and related asset-backed securities coincides with the rise of credit, and also allows an easier extension of credit when these assets are purchased (Adrian & Shin, 2010).

One problem is that only monitoring bank lending omits the build-up of credit from the issuance of asset- and mortgage-backed securities. The sole observation of traditional lending sources would also miss the liquidity collapse during the crash. Short-term liabilities such as repurchase agreements and commercial paper are now a better proxy for credit than monetary aggregates such as M2. Rather than a stock of available funds, liquidity is the growth of financial intermediary balance sheets and changes over

the cycle. Adrian and Shin's work is yet another example of new credit dynamics, most importantly its interconnection and feedback to capital markets. The expansion of nonbank financial intermediary balance sheets through collateralized lending releases additional funding, which chases yield in further asset purchases.

3.6. Conclusion

Beginning in the 1980s, traditional macroeconomic dynamics have changed in response to credit and asset price growth. Household expenditure, net saving, and net worth have all shifted from their trends over the past three decades. Altered interactions between real and financial variables are troublesome for mainstream macroeconomic authors to integrate. One response to the fall in household saving has been to redefine the term to include holding gains or losses of financial and nonfinancial assets. The net worth form of saving stems from the Flow of Funds definition where saving is the change in net wealth from one period to the next. Net worth shifts in response to both flows of saving and the reevaluation of existing assets. The broader formula for saving provides an additional explanation for sustained expenditure as residual saving has plummeted and middle incomes have stagnated. The rise of net worth has allowed for households to reduce saving without significant financing or expenditure issues for households or firms. Many researchers have recognized raised collateral values as allowing a unidirectional link, whereas households increasingly rely upon debt-finance.

Instead, this chapter has argued that credit expansion is also a causal factor behind asset appreciation and subsequently net worth. A multidirectional link exists between asset prices and credit. The connection is reinforced by the fact that asset price gains and

losses are the primary component of change in household net worth. In addition, recent empirical literature shows that global liquidity, domestically and internationally, is the factor behind asset price growth. Finally, we have shown, with data from the IMAs, NIPAs, and FOF, the increase of credit Granger-causes holding gains and losses in financial and nonfinancial asset values.

Credit as driven by asset price appreciation is also consistent with the recent U.S. capital account surplus, where foreign flows have filled the U.S. saving gap. Nations with a positive current account have channeled their surplus funds into public and private U.S. financial assets. Foreign saving has directly met U.S. financing and liquidity needs while indirectly further propping up asset prices. The latter effect props up the real sector's balance sheets in spite of their own diminished residual saving and can align with the net worth-saving literature. However, the rise of global liquidity demonstrates that the saving from surplus nations alone is not sufficient to explain what we have shown is a multidirectional link (Claudio & Borio, 2011; Shin, 2012).

When expenditure, credit, and asset prices are impacted by financial influences such as sentiment and irrational expectations, models based upon the EMH with agent rationality and foresight have less credence. Rather than signaling expected returns in line with fundamentals, asset values are also driven by inertia, herd behavior, and the rise of aggregate liquidity. Likewise, credit and finance are no longer restrained by traditional anchors such as available and physical saving. Monetary aggregates need to be supplemented with those monitoring credit (Erturk & Ozgur, 2013). Likewise, market-based financial intermediaries' balance sheet behavior should receive additional scrutiny (Adrian & Shin, 2009). Financial asset prices and credit growth are self-supporting, and

their reinforcing influence has grown with the stages of financial liberalization.

Asset prices and asset mispricing have significant macroeconomic effects that traditional economics has failed to capture. Clearly, this behavior has not gone unnoticed. Authors from Keynes to Shiller have outlined the potential for bubbles and asset mispricing. Financial players such as George Soros and economists Adrian and Shin have connected credit dynamics and their reflexive response. Each has captured a part of the broader economic implications from the closer link and response of asset prices and credit following financial innovation and deregulation.

Much of the saving and capital gains issue reduces to the difficulty in incorporating financial variables and their real impact. Specifically, asset price volatility and its influence upon the macroeconomic income-expenditure balance are not well systematized, which is addressed in Chapter 4. The essential insight remains: asset price appreciation and credit growth have permitted the decline in saving without negative spending or output effects. However, further bubbles, financial crises, and liquidity shortages are likely to persist, as financial markets and their pricing of assets remain fickle and volatile partners

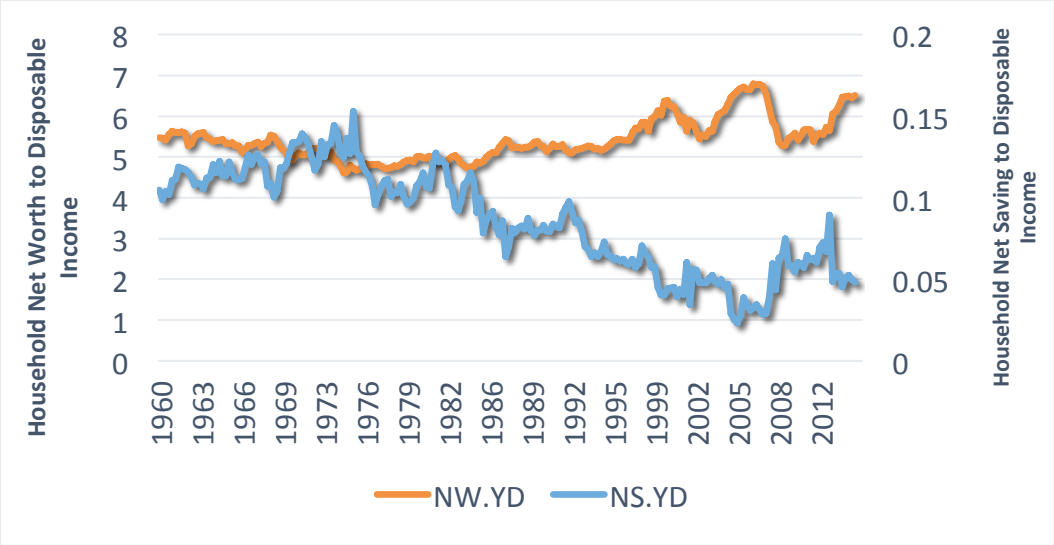

Figure 3.1. Household net saving to disposable income and net worth to disposable income ratios.

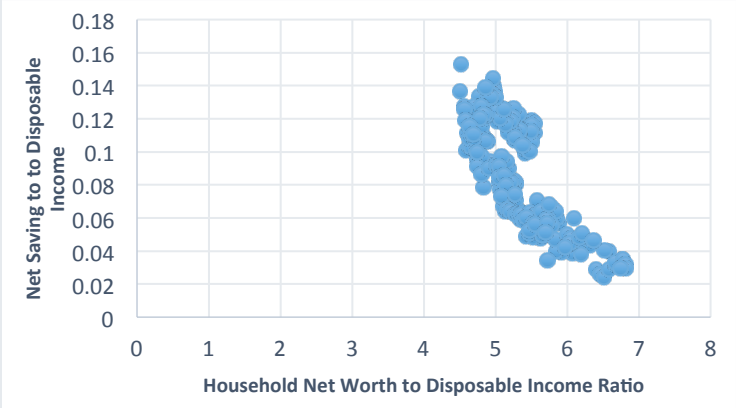

Figure 3.2: Net saving and household net worth to disposable income.

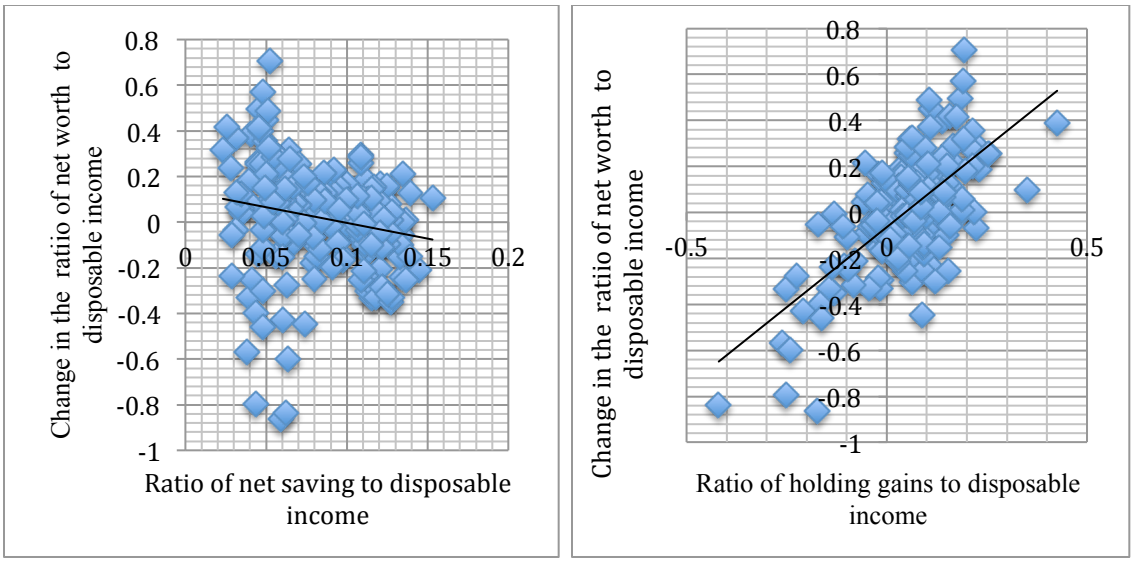

Figure 3.3: Net saving to disposable income and holding gains to disposable income in comparison to a change in net worth to disposable income 1960-2014.

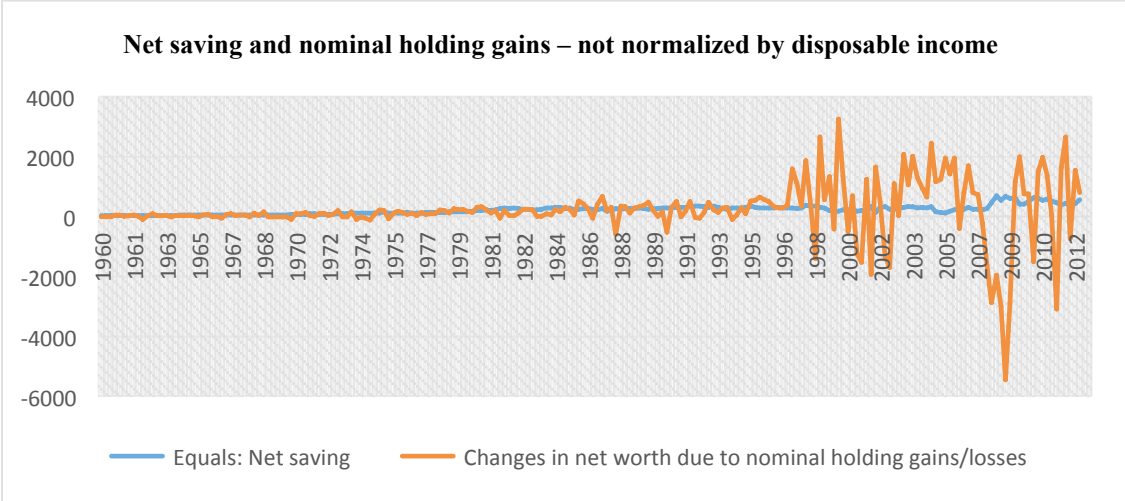

Figure 3.4: Net saving and nominal holding gains.

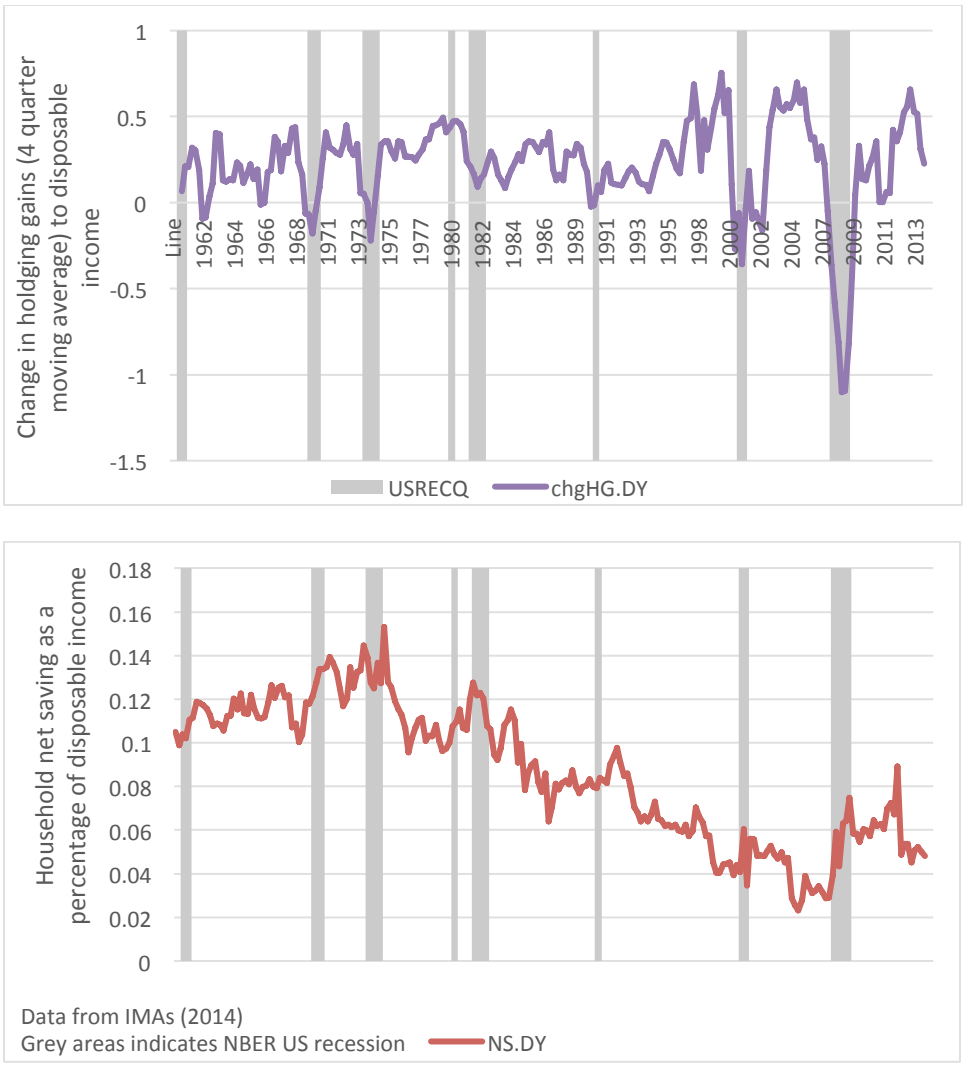

Figure 3.5. Change in holding gains/losses (above) and household net saving (below) from 1960-2014.

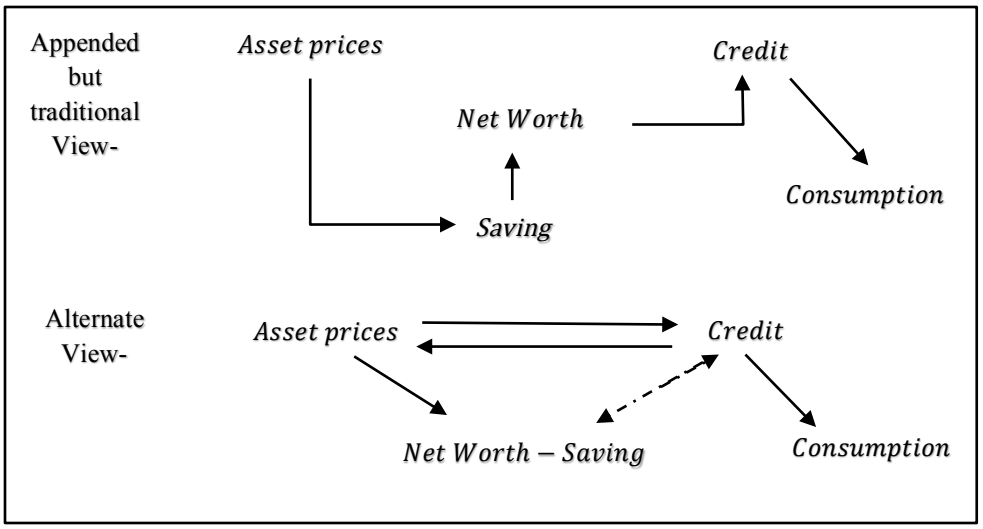

Figure 3.6. Views of credit-saving-asset price interaction.

Table 3.1. Augmented Dicky-Fuller Tests for Stationarity

Augmented Dickey-Fuller Tests			
Variable		**ADF Test Statistic In Levels**	**In 1st Differences**
cr	trend, lags =2	-2.03	-4.34***
hhnw		-1.03	-5.21***
hg		-5.54***	-5.32***
con		-0.90	-5.38***
***Indicates significance at the 99% level ** Indicates significance at the 95% level			

Table 3.2. Granger Causality Tests[40]

	$\Delta cr \rightarrow \Delta nw$	$\Delta cr \rightarrow \Delta hg$	$\Delta cr \rightarrow \Delta con$
1960-2014	1.38 (0.24)	1.12 (.343)	1.12 (0.32)
1996-2014	1.37 (0.25)	**3.589** **(0.03)**	0.92 (0.45)

	$\Delta nw \rightarrow \Delta cr$	$\Delta nw \rightarrow \Delta hg$	$\Delta nw \rightarrow \Delta con$
1960-2014	**9.24** **(0.00)**	**1753.2** **(0.00)**	1.88 (0.11)
1996-2014	**6.20** **(0.00)**	**651.88** **(0.00)**	**4.27** **(0.02)**

	$\Delta hg \rightarrow \Delta cr$	$\Delta hg \rightarrow \Delta nw$	$\Delta hg \rightarrow \Delta con$
1960-2014	**5.65** **(0.00)**	**13.58** **(0.00)**	1.68 (0.15)
1996-2014	**4.24** **(0.00)**	**3.75** **(0.00)**	**2.44** **(0.03)**

	$\Delta con \rightarrow cr$	$\Delta con \rightarrow hg$	$\Delta con \rightarrow \Delta nw$
1960-2014	**13.21** **(0.00)**	**3.21** **(0.01)**	**2.80** **(0.02)**
1996-2014	**3.21** **(0.01)**	**4.06** **(0.00)**	**5.09** **(0.00)**

Note: The table reports F-test statistics for Granger causality where significant test statistics are in bold and P-values are in parenthesis.

[40] The credit index used here is nonfinancial private credit and is in its log-differenced form. Granger causality results from holding gains to credit are similar when using an index for household credit. Likewise, household net worth Granger-causes various forms of credit: consumer credit, home equity, and the illustrated nonfinancial private credit. As in Chapter 2, the data are real but in the log difference form following stationarity tests. However, Granger tests were also performed upon real credit to disposable income, net worth to disposable income, a four-quarter moving average of holding gains to disposable income, and the change in consumption. The findings were largely similar for all variables, but the credit-holding gains multidirectional link in the last subperiod remains robust.

CHAPTER 4

THE INFLUENCE OF ASSET PRICE REVALUATION UPON THE INCOME-EXPENDITURE BALANCE

4.1. Introduction

Chapter 2 documented persistent consumer spending in the face of stagnant wage growth. In Chapter 3, it was shown that asset price revaluation has substantially influenced the credit supply, acting as a substitute for household saving that began falling in the mid-1980s. The resilience of consumer spending and falling saving in the face of stagnant wages in the past three decades, discussed in previous chapters, has been subject to different explanations. For instance, some researchers have suggested that financial asset price inflation can be included in a broader notion of saving. Others have suggested that the wealth effect supplemented consumer expenditure even as median incomes remained stationary. At issue for both sides of these debates is the manner in which financial markets discount future profits and thus the determination of asset prices and how that impacts finance, expenditure, and output. It is the change in expectations that goes unseen on the firm's balance sheets though they strongly influence the firm's spending behavior and its relationship to its creditors. Economics and finance both have trouble incorporating expectations.

This chapter examines the manner in which asset pricing and asset price changes

influence the income-expenditure balance. Even if it is assumed that asset prices are "correct" or in line with fundamental values, there is no agreement on how their revaluation impacts the economy among macroeconomists. Chapters 2 and 3 alluded to three mechanisms that account for how asset price changes impact the macrobalance: (a) wealth and collateral effects, (b) an increase in firms' net worth, and (c) the rise of credit supplying institutions' net worth. In this chapter, it is argued that all these mechanisms, invoked variably by both mainstream and heterodox economists alike, leave out the important role of changes in financial sentiment on asset values.

We propose that an essential omission in conventional macroaccounting is in the treatment of profit expectations and how they are embodied in asset prices, which matters because changes in market sentiment over the cycle typically have disparate effects on balance sheets. Securities are liabilities in the firm balance sheet that are issued against expected future profits, which are part of firms' implicit assets. What is an asset for the purchaser is for the issuer a liability of the same amount; however, when expected profitability of the borrowing firm subsequently changes, the two values on the asset and liability side typically diverge. For instance, an increase in expected future profits (assets) higher than initially anticipated and thus higher than the value of securities at the time of issue can create a net margin that raises the net worth of either the issuer or the purchaser of the security. If the market value of the security rises by the same amount as the increase in profit expectations, this margin accrues to the purchaser of the security and to the firm if it rises by less or is fixed. The important result is that changes in asset values alter the income-expenditure balance through this disparate effect on balance sheets.

Incidentally, this issue also comes up in a recent debate between Paul Krugman

and Steve Keen over whether changes in private debt involve a direct net increase in aggregate demand (independently of differences in spending propensities between borrowers and creditors), which will be discussed at length in Section 4.3. The chapter will also revisit, in Section 4.4, how the issue comes up in Keynes's discussion in his *Treatise* (1930), where the effect of changes in financial sentiment on firms balance sheets play an important part of his analysis of business cycle dynamics.

4.2. Forms of Asset Revaluation and the Income-Expenditure Balance

Following Keynes (1936), macroeconomic principles teach that *ex post* income (Y_i) must equal *ex post* expenditure (Y_e) as shown in equation 4.1. Equilibrium or at least accounting consistency is reached when economic output matches national income and total spending. For a domestic economy, national income is the sum of wages, profits, rents, dividends, and interests received. Income equals output and the aggregate expenditure from households and firms.[41] Both sides of the identity in the equation are driven by real behavior, which is responsive to monetary factors.

$$Y_e = Y_i \tag{4.1}$$

Chapter 3 discussed the problem of conflating saving with the finance required for investment. Saving is thought to be the movement of funds to borrowers as lenders purchase financial assets. New asset issuance is the transfer of purchasing power as one party delays spending. Though often not made explicit, the synonymous treatment of

[41] For the present, our discussion assumes away international issues and government spending.

saving and finance is based on the assumption that the asset's value is in line with *fundamentals*, i.e., no asset mispricing exists. However, even when asset prices remain equal to the expected discounted value of the asset's payoff (Cochrane, 2009), asset price revaluation can alter the income-expenditure balance. In various examples discussed in Chapters 2 and 3, asset inflation is recognized by the household wealth effect, the rise of firm net worth, and the advance of credit suppliers' balance sheets.

The wealth or collateral effect alters the income-expenditure balance through the positive effect of asset price inflation on consumption. Wealth effects occur as households experience a positive shock to their net worth from asset revaluation. A boost in household financial stance whether from financial or nonfinancial assets may occur in conjunction with or in isolation from saving. The marginal wealth effect stimulates consumption as agents draw from their accumulated store of wealth. Both short- and long-run wealth effects are found to influence consumer spending.[42]

The discussion in Chapter 2 and the research by Mian and Sufi (2014) suggest that the effect of asset price changes alone can explain much of consumption in the 2000s.[43] Asset price gains have supplemented sluggish income gains, permitting consumption's rise in the late 1990s and mid-2000s. Spending on durables and nondurables raised wages for workers producing those goods, altering both sides of the

[42] As reviewed in Chapter 2, the magnitude of short- and long-term wealth effects varies with time and the method of study. Using cointegration, authors such as Mehra (2001, Davis and Palumbo (2001), and Dynan and Maki (2001) find the effect of a $1 increase in wealth to range between 3 and 5 cents. However, Carroll, Otsuka, and Slacalek find the next quarter effect of a $1 increase in wealth to be about 2 cents, with the overall and later effect rising to 9 cents (2011). Their method highlights habit formation or overall 'stickiness of expectations' that is free of cointegration. See Chapter 2 and page 30 for a critique of cointegration methods.

[43] The primary factors for Mian and Sufi in drastic decline of consumption from continued debt overhang for lower income groups following the Great Recession (2014). They argue that much of the resulting private debt and credit buildup was unevenly distributed for poor neighborhoods and that the crash has disproportionately hit them as well. The causes of easy credit grew in line with asset price inflation, as discussed in Chapter 3.

income-expenditure balance. However, the composition of assets varies drastically across households, reflecting their unequal distribution. Other than those income earners in the top decile, housing and primary residence is the primary asset on the household sector's balance sheet (Wolff, 2012). The capitalization of expected profits and the influence of wealth upon the macroidentity have occurred through nonfinancial assets for most households.

The behavior of credit-supplying institutions can also be linked to the income-expenditure balance. In their influential 2008 paper, "Liquidity and Financial Cycles," Adrian and Shin bring to light the relationship among asset price change, net worth, and the extension of credit. Specifically, when asset price gains show up on balance sheets, financial intermediaries are proactive and rapidly increase their lending. Adrian and Shin find a strongly procyclical relationship between the change in leverage and the change in balance sheet size for investment banks, unlike other agents in the economy. Financial intermediaries avoid excess capital (capacity) as asset prices rise, through active management of short-term debt on the liability side.

Adrian and Shin focus on the role of aggregate liquidity, which is defined as the rate of growth of balance sheets and is tied to how much effort intermediaries put into searching for borrowers. "If increased funding for asset purchase leads to increases in price and risk appetite in the system then the expansion of balance sheet will be reflected in asset prices in the financial system" (Adrian & Shin, 2008, p. 30). For individual firms, this behavior may make sense, but Adrian and Shin contend that procyclical leverage has significant macroconsequences through its effect on funding, which subsequently affects investment and consumption.

Procyclicality in the supply of lending is similar to Bernanke and Gertler's 'financial accelerator' model, where credit moves endogenously over the cycle, amplifying and propagating shocks within the economy (Bernanke & Gertler, 1999). The net worth of both borrowers and lenders is of increased importance as lenders' willingness to lend is a function of both borrowers' financial position and their own. Typically, the risk of intermediation rises with leverage, though this is masked by the rising value of assets.

Shin (2012) adds an international explanation for recent crises, adding to traditional narratives of exogenous forces or macroshocks. His 'Global Banking Glut' outlines the role and increasing reach of global financial intermediaries in manipulating credit and borrowing conditions. These findings are confirmed by Borio, who, in a series of papers, outlines the impact of asset prices upon both the domestic and international economy and the potential for instability (Borio & Lowe, 2002; Borio & Disyatat, 2011). The trouble both domestically and internationally occurs as the financial climate changes. Once financial sentiment turns and asset prices fall, balance sheets that were thought to be robust become ridden with excessive debt, causing credit, spending, and eventually incomes to contract.

It is well established that firm investment is strongly responsive to firm net worth, which varies with asset prices. In the early 1990s, New Keynesians introduced firms' internal finance and net worth as key explanatory variables of investment. For example, Fazzari and Petersen tie the scale of firm investment to cyclical changes in internal finance or the strength of firms' balance sheets (1993; Hubbard, Petersen, & Fazzari, 1987). If firms are sufficiently liquid, with a highly valued stock of working

capital and internal finance, fluctuations in cash flow can be offset without external financing. Rising asset prices in the past three decades have increased the ability of firms and agents to obtain loans or issue equity (Panetta & Angelini, 2009). The ease with which new equities can be sold is itself related to the expected future firm profitability and the behavior of outstanding financial assets.

Arestis and Karakitsos have performed a more recent and thorough analysis of investment for each business cycle since 1949, showing that the firm balance sheet became more relevant in explaining gross U.S. investment following the 1991 and 2000 business cycles (Karakitsos & Arestis, 2013). The corporate sector's net worth to GDP was tested for cointegration for short- and long-run variables and found to be significant for long-run firm spending as well.

In contrast to all these approaches, Keynes's *Treatise* provides a conceptual framework that focuses on firm's response to asset appreciation and the shift in asset price and profit expectations over the cycle (1930). During what he calls a "bull market with a consensus of opinion," a firm's actual increase in profits and asset prices is greater than expected.[44] At this stage, the firm can either issue new securities or borrow at a lower cost against the new collateral. Effectively, the capitalized value of future expected profits, embodied in existing capital assets, is less than the actual increase in the profits they create. Keynes refers to the early expansion as a time where financial asset prices are rising though not at the same pace as firm profitability. Though altered, Keynes's views

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[44] Though related, Keynes's early view differs from Tobin's Q, or the ratio of market price to firm net worth or replacement value. Keynes's four speculative states allow a distinction between valuation rising from speculative motivates rather than in response to real profitability. For Keynes, a divergence occurs between Keynes's "bull market with consensus of opinion" to one of "division." Under Tobin, the rise in the market value of asset prices is still reflective of expected profitability for both periods (Tobin & Brainard, 1968).

on profit expectations were also prevalent within *The General Theory*, where "a monetary economy, as we shall find, is essentially one in which changing views about the future are capable of influencing the quantity of employment and not merely its direction" (Keynes, 1936, p. vii).

Financial sentiment, asset price changes over the cycle, and their subsequent effects upon balance sheets are also emphasized by Minsky (1986, 1975). In both works, a sector's financial stance moves with the stage of the financial cycle and degree of speculation. Erturk suggests that the "essential insight Minsky drew from Keynes was that optimistic expectations about the future creates a margin, reflected in higher asset prices, which makes it possible for borrowers to access finance in the present" (Erturk, 2006, p. 3). The rise in prices and the expectation that they will continue to rise adds an important though unseen boost to the firm's balance sheet. Positive views of profits allow for ease of future equity issuance or the continued ability to borrow against the rise in net worth.

4.3. Profit Expectations and the Macrobalance: Krugman Versus Keen

There is wide agreement with Keynes's argument that views about the future affect output and labor outcomes, but the agreement does not extend to the exact mechanism by which that happens. The recent debate between Steve Keen and Paul Krugman (2012) over the effect of changes in private debt on income and expenditure balance is an example of where these differences have come to the surface. In Keen's macroaccounting, the growth of debt liabilities is a source of aggregate demand. Keen's addition of private debt to the income side of the macroidentity intuitively recognizes the

role expectations play in agents' willingness to lever in a particular sector. However, Krugman and many Post-Keynesian (PK) authors have been quick to point out accounting flaws, criticizing Keen for deviating from the age-old conventional view of macrobalance.

The debate also provided a succinct statement of the New Keynesian (NK) view of macroaccounting and the treatment of finance. Krugman and Eggertson's work highlights the problems of debt overhang, deleveraging, and resultant depression of aggregate demand following the Great Recession (2012) from this perspective.[45] Within a 'simple New Keynesian model,' the different roles that private debt and public debt play in a crisis are emphasized. A reduction in willingness to take on private debt hinders recovery, causing a demand gap, which can be filled by government deficit spending that increases public debt. In a flexible-price endowment model, the process of intermediation between borrowing and lending is conceptualized as the exchange of risk-free securities between 'patient' and 'impatient' agents.[46]

Each agent has the same initial endowment but a different time preference for consumption. Purchasing power is transferred between agents, though the amount of debt one can carry is limited. The transition between the two stages, D^{high} to D^{low}, suggests that the debt limit may vary endogenously. Integrating a rudimentary reading of Minsky, the boom encourages growth in leverage and the relaxation of lending standards. At some

[45] Though acknowledging sticky prices and other slight imperfections, events such as the Great Recession are seen as highly abnormal. In situations such as these, normal economic rules for Krugman become 'topsy-turvy.'

[46] In their (2012) paper, Krugman and Eggertson motivate lending with the assumption that the borrower has access to 'investment opportunities' whereas the saver can invest only in the risk free bond (2012).

point, a Minsky or Wiley Coyote moment occurs.[47] As agents simultaneously attempt to reduce their debt, the negative effects of Fisher's debt-deflation take hold.

Although they acknowledge concerns about deleveraging and debt-deflation, NK economists are not typically concerned with the growing level of debt. Private debt should not matter as "one person's debt is another person's asset" (Krugman, 2012, p. 43). Another NK economist, Ben Bernanke (2000), suggests, "absent implausibly large differences in marginal spending propensities among the groups…pure redistributions should have no significant macro-economic effects" (p. 24). Thus, if one party's debt is merely another's asset, private sector debt, even if rising, is of marginal importance. A similar thought holds for asset price inflation on the other side of balance sheets.

At least under normal conditions, for NK economists, bank lending is a reallocation of purchasing power; commercial banks transfer existing funds in making loans. Any increased borrowing or lending must be supplied by an inflow of new savings from the household, firm, foreign, or government sector following loanable funds assumptions. As a bank acts only as an intermediary between savers and borrowers, the size of its assets can be ignored.[48] Lending is then constrained only by deposits and reserves and the liquidity constraints of borrowers.

The simplest depiction of Eggertson and Krugman's (2012) view of intermediation between patient and impatient agents is shown in Table 4.1. In this basic accounting, the banking sector does not exist; instead, lending occurs as risk-free bonds

[47] Krugman and Eggertson (2012) appear to equate the two phenomena, omitting Minsky's rich portrayal for how the boom's optimism breeds its own demise. Instead the bottom just drops out, but everything is okay so long as one does not look down. In addition, the model portrays the potential for Keynes's 'paradox of thrift' and Eggertson's paradox of toil where producing more may lead to lower prices. Finally, they show a situation where price flexibility may in fact make the recession worse. If a negative demand shock is sufficiently large, the economy can also fall into the 'liquidity trap,' finding itself up against the zero bound.

[48] Bernanke (2000) provides another example of NK treatment of banking and private debt.

($-B_{imp}$) are issued by impatient to patient agents in exchange for their saved purchasing power ($+B_p$). The motivation for lending is the difference in the time preference of spending. The exchange of purchasing power is depicted in the fourth row as the consumption (C) by one party is put off and utilized by the other. The transfer of the asset and thus debt has no effect upon aggregate net worth or the rest of the economy.

Table 4.1's representation of Eggertson and Krugman (2012) can be extended to traditional forms of lending, (*L)*, in Table 4.2, which shows the transfer of savings from net lenders to net borrowers. [49] In a slight extension, the household becomes the patient agent, supplying savings in the form of deposits (*M)* to banks that issue loans (*L*) to firms for productive investment. In the NK model, deposits correspond to the savings by patient agents that are lent out. Money is created as loaned out funds return to the banking system in the forms of deposits via the money multiplier. In the textbook account, the primary restraint on the money creation process is the quantity of currency and the monetary base. The banking sector's net worth and capital are of little importance and do not change ($\overline{-NW_b}$) as assets are offset by liabilities at every step in the process. Equity issuance (E_f) is another financial asset that savers can channel funds to; it shows up as a liability for firms. Table 4.2 captures the NK treatment of banking where banks passively transfer purchasing power from savers to spenders. Again, government and foreign sectors are not considered, leaving a 'bare bones,' domestic, three-sector accounting of firms, households, and banks. This simplified view is helpful in seeing how NK economists perceive the income-expenditure and investment-saving balances.

[49] In this representation, the banking sector is a consolidated monetary authority, commercial bank, and other financial activity. Commercial banks act only as a pure credit intermediary issuing loans and credit when the supply of saving from the patient rises.

Private debt and wealth become concerns only when liquidity and borrowing constraints drastically change.[50] However, real funds or saved purchasing power from one party's income must be present to be intermediated toward another's expenditure.

Keen argues against this view, making the provocative claim that expenditure exceeds income at a given time from the turnover of new debt.[51] However, his macroaccounting is at odds with Keynes's *ex post* income-expenditure identity. [52] Following Minsky in *John Maynard Keynes*, Keen separates *ex ante* and *ex post* forms of investment, so that investment surpasses intermediated household saving (Keen, 2014; Minsky, 1975, p. 133). The traditional interpretation of Keynesian theory of effective demand suggests that the differences between investment and saving cause an upward adjustment of income. In equilibrium and *ex post,* both income and expenditure, along with saving and investment, are equal. In contrast, Keen posits that the saving and investment relationship, or equivalently the expenditure-income balance, must diverge in an economic expansion. Keen states that Keynes's identities apply "in the abstraction of equilibrium, but Minsky's applying in the (normally) growing economy in which we actually live" (Keen, 2014b, p. 275).

Aggregate demand grows with the increase in debt while increasing net assets and

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[50] NK models are concerned with the distribution only to the extent that it alters spending behavior, and the models disregard the growing level and change in loans held by impatient agents. Therefore, the quantity of loans is of little importance, and even their growth can be viewed as a wash with asset growth being offset by liability growth. Bank lending and private debt do not affect aggregate demand as funds are transferred and then eventually returned in the aggregated financial system. The banking sector is a benign intermediary where loans are available only after saving is deposited.

[51] Keen also criticizes NK for following a loanable funds approach to the money supply. Instead, using an endogenous money framework, loan supply can meet growing demand without the reduction of another agent's spending. Lending increases the bank's assets and liabilities as loaned funds are deposited either in the individual bank or in the aggregate. Banks issue loans with keystrokes and are not limited by the monetary base, which allows an endogenous rise in the money supply.

[52] Keen assumes that households do not actively save any of the distributed profits but instead use them to consume more. If this assumption were relaxed, the increase in firm debt could be shown as the saving of households. Much of the confusion relates to the treatment of the saving as volitional (Moore, 2004) or as an accounting for past investment. Chapter 3 adds to this discussion.

supplying additional credit to the system. Keen asserts that,

> in a world in which the banking sector endogenously creates new money by creating loans, aggregate demand in a given period is the sum of aggregate demand at the beginning of that period, plus the change in debt over the period *multiplied by the velocity of money*. (Keen, 2014a, p. 12)

In line with Minsky, the growth of credit supports the next period's investment, consumption, or speculation.

The gap between *ex post* expenditures Y_E and *ex ante* income Y_I is financed with the turnover of new debt.[53] Keen's equation sums debt change for households, firms, and banking sectors $Y_E - Y_I = \delta(\frac{d}{d_t}D_w + \frac{d}{d_t}D_\pi + \frac{d}{d_t}D_{FI})$, where various forms of debt (*D)* finance the consumption of workers, capitalists, and investment. The use of *ex ante* and *ex post* relations provides the means by which the economy can expand with private debt supplementing present income or saving. Keen's approach differs from both NK and PK perspectives where public, private, and foreign sector balances net to zero during a given period (Godley, 1999). Rather than balancing between the sectors as in other models, the positive change in financial debt fills the gap between income and expenditure, breaking with double-entry accounting.

Keen views his own contribution as modifying the income – expenditure and saving – investment identities to model capitalism with growth. For growth, the sum of all sectors' spending must exceed income, where borrowing permits the excess. Keen's critics disapprove of his break from the traditional macrobalance and national accounting standards.[54] Further, they suggest that his results may hold for one sector where

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[53] Again, only a change in debt alters the *ex post* relationship, as "income and expenditure are identical to each other at all times except where there is a debt-financed addition to expenditure" (Keen, 2014b, p. 286).

[54] Post-Keynesian economists applaud Keen's incorporation of endogenous credit in the tradition of Minsky, Schumpeter, and Moore. However, they are critical of Keen's redefinition of key macroeconomic

$Y_e = Y_i + \Delta D$, but that for the entire economy, it is more accurate to state that $Y_e + \Delta A = Y_i + \Delta D$. Assets and debt liabilities are created simultaneously and thus are expected to cancel out, leaving a balanced income - expenditure table.

At issue is the method of accounting for expected asset price and profit gains or losses. Traditional macro- and financial economics posits that the rise in asset prices, if mispricing is nonexistent, stems from rising expectations of return in line with the issuing firm's fundamentals. However, asset values and company profitability may rapidly diverge, and that possibility lacks a consistent treatment in conventional accounting.

The addition of discounted future profits captures "what, at least Marx and Keynes, regarded as the most fundamental fact of capitalist economies—that firms produce in order to gain a monetary profit" (Brunn & Heyn-Johnsen, 2009, p. 220). However, most macroeconomic accounting remains *ex post,* making it difficult to monitor all the changes occurring within that period. This is the case even when using progressive heterodox methods of accounting such as the Stock Flow Consistent (SFC) approach. For instance, SFC methodology and models have not fully been adapted to capture cyclical changes from balance sheet fluctuation. These *ex post* restrictions make it difficult to present Keen's argument. That is, SFC models treat the financial structure of firms as a "linear process, in a real economic system the evolution of firms' balance sheets will be conditioned both by the level of overall financial development and by the current position within the business cycle" (Toporowski & Mitchell, 2012, p. 193). [55] These shifts are difficult to depict in stationary accounting matrices even if the models

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balances. Luminaries such as Thomas Palley and Marc Lavoie question the need for and wisdom of redefining the income-expenditure relation (Lavoie, 2014; Palley, 2014).

[55] An additional and related concern is what starts the expansion within the SFC accounting. Much of the SFC literature relies upon an initial injection from the government to start the cycle. The following section addresses these concerns.

are dynamic. The crucial issue is accounting for shifts in profitability over the cycle and asset inflation that can feed back upon income and spending choices.

4.4. Profit Expectations and the Firm's Balance Sheet

Krugman, in line with the traditional Keynesian representation of the income-expenditure identity, assumes the two are equal for an economy at rest.[56] However, Keen's insight is also correct: within a certain period, economic agents formulate views about the future that can both influence and permit spending to exceed income (Bernardo & Campiglio, 2013).[57] Keynes's *Treatise* presents a useful method to frame the issue. In the early stages of the boom (bust), the expectation of return (loss) creates a margin in balance sheets that allows (or reduces) access to credit. The change and thus the alteration of the macrobalance are from a shift in market expectations and thus a change in the level of confidence from the financial sector. In order to show how accounting identities hold even when the economy is out of equilibrium and expenditure exceeds income, profit expectations need to be shown explicitly on the asset side in firm balance sheets. Firms have both tangible and intangible assets.

Tangible capital refers to plant, machinery, and other factors of production along with all accumulated funds on the asset side of firms' balance sheets. The accumulation of these assets can in part be balanced by the change in new debt liabilities issued by firms to finance their acquisition. Intangible capital can be thought of as all expected

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[56] The end of a period is the manner in which the national accounts (NIPAs and IMAs) treat the relation.
[57] Bernardo and Campiglio attempt to address how both Krugman and Keen are correct in their own paradigms (2013). They argue that the debate between Keen and Krugman is also one of differing definitions of aggregate demand, the former as *ex ante* and the latter as *ex post*. Their paper creates a model showing Keen's intuition, which can still function with the traditional macrobalances, keeping the *ex post* relationship. Rather than redefining the *ex post* relationship between current income and planned expenditure, planned and realized variables are separated, which creates a gap to be filled with new credit issued by private banks.

future profits, and these are the assets that balance new liabilities at the time of their issue. This unseen asset also balances the change in the size of bank balance sheets early in an expansion. At a broader level, intangible though expected wealth supports the rate of change in the private debt Keen emphasizes. During the early business cycle upturn, a change in the level of private debt reflects a change in intangible capital in the form of higher expected future profits.

Keynes's speculative states in the *Treatise* are of particular importance to the Krugman versus Keen debate. In his discussion, rising asset prices from higher profit expectations create new borrowing opportunities during the early boom period. For Krugman, a rise in debt is offset by a rise in assets, though the *ex post* balance does not adequately describe how balance sheets change over the cycle. Keen's focus on private debt recognizes increased wealth as collateral, but does not explicitly incorporate expected profits as the motivating source and collateral for new borrowing. Wealth fluctuations over the cycle are driven primarily by asset price inflation.[58] The expectation of growth in asset values and their use as collateral is often lost and difficult to pin down in static balance sheets.

The supply of credit, both from deposit and nondeposit intermediaries, is positively influenced by borrower net worth, what Erturk (2005) refers to as a margin. As asset prices rise with expected profits, firms can more easily sell their future profits to fund investment. During the early expansion, both borrowing costs and the expenses of security issuance are reduced as buyers add expected capital gains in their purchase

[58] In discussing the macroeconomic effects of private debt, Keen shows the tight negative correlation between private debt and unemployment and a positive correlation with asset prices. Asset prices and debt create a 'positive feedback loop' in which increasing debt increases asset prices and growth in prices drives more and more people to engage in speculation (Keen, 2012).

decision (Toporowski, 2009). Financial market valuation of future profits provides a strong present effect in that they generate finance in anticipation of future firm profits.

Additional financing from raised collateral values and wealth can be shown on simple firm balance sheets. Keynes divides the boom into two periods; the first he calls a "bull market with consensus of opinion" and the second a "bull market with division of opinion." In the first period, economic agents in the firm, household, and banking sectors are confident about future returns to business. As market participants believe prices to be undervalued, asset values move upward with continued speculative asset purchasing. The early expansion begins with anticipated firm profitability reflected in the rising value of investment goods. The value of current investment rises so long as financial markets presume both profit and asset price growth.[59]

Optimistic expectations raise a firm's intangible assets though they are seldom shown explicitly in balance sheets. An altered three-sector balance sheet illustrates how positive profit expectations create a margin that makes additional lending possible. In comparison to Table 4.2, Table 4.3 also includes profit expectations (π^e) on the asset side. In Table 4.2, the growth of assets in a sector is matched with the increase in its debt liabilities, leaving net worth unaffected.[60] By introducing profit expectations explicitly to the asset side of firms' balance sheets, we can see how asset price fluctuations can cause net worth changes in one sector that are not offset by an opposite change in another.

Static balance sheets implicitly assume that changes in expected future profits are

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[59] As in the *Treatise*, optimism begins the cycle but becomes a real force by creating windfall profits in the capital goods sector, which causes financial markets to become more bullish in their pricing of future profits.

[60] For example, assuming marked to market accounting, when households hold equities and deposits, asset appreciation raises household net worth (NW_h), just as the net worth of businesses (NW_b) issuing equities diminishes. Overall wealth and debt within the economy would remain the same.

fully captured in proportional changes in the values of existing and newly issued ($(e_f + \Delta e_f)p$) equities, but ignore the possibility that changes in expected firm profitability ($\Delta F\pi^e{}_{(+1)}$) and those in asset values might diverge over the cycle. Keynes's early expansion refers to a situation where the rise in firm expected profits $K_f(1 + \pi^e)$ on the asset side exceeds the increase in the value of existing equities ($\Delta p * e_f$) on the liability side of the firm balance sheet. This is the margin created by optimistic expectations in firm net worth, against which firms can either issue additional equity or simply allow existing prices to rise, which transfers this margin to existing stockowners. In either scenario, there is a net increase in the economy wide net worth, and, when asset price increases initially fall below rising profit expectations, the firm's net worth rises. The increased expectation of profit acts as a form of collateral that permits the additional access to credit in the present.[61]

An accounting memo is added at the bottom of Table 4.3 to demonstrate how balances change over the different stages of the cycle. Anticipated profits are the only entry that can change without a counterbalancing item in the accounting memo over the cycle. When profits are realized, they then can be distributed in dividends and/or held as retained earnings, turning into tangible assets available for investment or accumulation of reserves. The second feature of the accounting memo (assuming no new equities are issued for simplicity) depicts the gap between profit and asset price growth in the early phase of the cycle $\left((\Delta\pi^e - \Delta p * e_f) > 0\right)$. As long as the bull market with consensus of

[61] To be consistent with SFC accounting, a transactions matrix (TFM) could also be created. A TFM would need to add two features to standard versions. First, within the firm's capital account, an entry should be created for expectations of positive firm profit one period into the future. Expected profits ($+F\pi^e{}_{(+1)}$) would then be seen in column four and row seven within the capital account. The second feature would be the accounting memo.

opinion persists, the difference between the two sides remains positive. The margin created is one method of demonstrating how views about the future create a real force upon the economy in the present (Erturk, 2005). This is an important distinction given that the possibility of divergent profit expectations and asset price changes has not been addressed in either traditional or heterodox accounting matrices, which is a result of omitting intangible assets such as future expected profits in firm balance sheets.[62]

In late expansion, the bull market with consensus of opinion ends, and the margin disappears before it eventually becomes negative, which is the result of anticipated profits having stopped rising as fast as the increase in asset values. The change in the margin happens when asset prices are driven higher by speculation, outpacing any realistic expectations of profitability; "actual profits cannot increase at an increasing rate, while asset prices often will. Thus, sooner or later, optimistic expectations, and thus the asset prices that they underlie, outstrip the actual performance of profits" (Erturk, 2006, pp. 16-17). Though still expanding, the economy has transitioned to what Keynes refers to as a bull market with division of opinion. Financial sentiment begins to shift towards the view that assets are overvalued.

The length and persistence of the late expansion depends on the optimism and belief speculators have that asset prices will continue to move upwards. So long as asset prices rise, the terms with which speculators can borrow funds from banks remain manageable. Economic performance and actual profits, however, increasingly fall short of their earlier levels capitalized in asset values. The now negative gap between profit

[62] One reason is that NK and neoclassical economists ignore the divergence because it implies to potential asset mispricing. Even after the subprime crisis, financial macroeconomics has been dominated by various versions of the efficient market hypothesis, which assumes asset prices are always in line with fundamental values.

expectations and asset price growth $\left((\Delta\pi^e - \Delta p * e_f\right) < 0)$ reinforces market perception that assets are overvalued. Rising debt that once fuelled the expansion now becomes a burden on the economy.[63]

The decline in intangible capital causes firm net worth and collateral to shrink, and depending on central bank policy, easy credit conditions might dry up. As actual profits fall, firms have greater difficulty meeting current obligations and run down internal reserves. When firms begin to liquidate their positions in order to meet current cash flow commitments, asset prices collapse.[64] The problem is only exacerbated as prices continue to plummet, further reducing access to credit.

Returning to the debate between Keen and Krugman, the different financial worlds they assume can be bridged in part by introducing a very elementary form of banking. As Minksy remarks, banking historically starts out with the discounting and guaranteeing bills, providing short-term funding to the borrower against its expected future profits. In other words, the bill is a future liability for the issuer that will be balanced and retired by future profits at the time of expiration. Once a bank guarantees the bill, it can function as money and thus turns into an asset in its issuer's balance sheet.

In other words, the bank's intervention transforms one type of asset (the firm's expected future profit) into another type in the form of a bill that can be used as purchasing power by the issuer. In this process, the only liability incurred by the bank

[63] Here, the Keynesian point on the late expansion is similar to the problems Toporowski notes for overcapitalization. The increasing use of financial markets, both in equity issuance and holding financial assets in excess of current production needs, may be beneficial during the boom. However, excessive financial holdings become problematic for balance sheets as asset inflation turns to asset deflation (Toporowski, 2009). Negative future profit views are detrimental to the firm as future capitalized earnings cannot meet the needs of existing payments, and the fall in collateral values further reduces access to credit.

[64] The growing reliance of firms on internal finance in the past two decades and financial cycles is backed up by both Karagiannis, Madjd-Sadjadi, and Sen (2013) and the New Keynesian literature (Fazzari & Petersen, 1993).

that guaranteed the bill is a contingent one, which does not involve a fall in purchasing power of any creditor. It is reasonable to assume that the increase in reserves the bank has to hold against its contingent liabilities is only a small proportion of the total value of the bills the bank guarantees. There is a net increase in total assets (equal to the expected profits minus the incremental increase in bank reserves) and thus in firm net worth that is not balanced by a counter movement by anyone else in the economy.

When the bill (or CP) is accepted as payment by another firm, the bill enters a new balance sheet as money (an asset). Table 4.4 uses commercial paper (*CP*) as the issued and held bill. This example highlights what is missing in Krugman's account and what Keen is trying to get at: Optimistic expectations about the future create intangible wealth, a form of collateral as tangible wealth, creating a net increase in net worth that is not offset by an increase in someone else's liability.

The addition to profit expectations (π^e) to the firm balance sheet makes explicit the margin that makes the separation of income and expenditure possible. However, just as optimistic profit expectations can raise the value of assets without an offsetting change in liabilities, the obverse it also true. Pessimistic expectations can destroy intangible wealth without a corresponding reduction in liabilities. The income-expenditure balance can be restated as $Y_e + \Delta A + \pi^e = Y_i + \Delta D$ within a given period, where ΔA refers to tangible assets only. The change in tangible capital values plus profit expectations or intangible capital, together, need not always equal the change in financial liabilities. In fact, debt may still rise on the right-hand side matched by the change in assets, though demand remains deficient from falling and negative profit expectations. The relationship can still be shown to balance *ex post*. The addition of intangible capital to the income-

expenditure balance captures Keen's intuition on the role of private debt and Keynes's insight regarding the importance of expectations and views about the future.

4.5. Conclusions and Steps Forward

Even under the stringent assumptions of rational behavior and efficient pricing, the inflation of financial instruments from changes in market sentiment can significantly alter the income-expenditure balance. Profit expectations in addition to asset prices, the already capitalized future expected profits, determine a sector's financial stance, which then affects income and spending decisions. The financial mechanism involved in the three channels (the household wealth effect, the rise in firm net worth, and the growth in size of financial intermediaries balance sheets documented in Chapters 2 and 3) through which asset price changes affect expenditure and income is discussed in Section 4.2.

In all of the treatments of asset price inflation, the disparate effects of shifts in financial sentiment on balance sheets are ignored. Implicitly, the macroaccounting in NK and even SFC models assumes that intersectoral flows of funds net out: the financing of one sector is equal to the saving of another. Clearly, the transfer of residual funds from one sector to finance the expenditures of another is a crucial piece of the puzzle. NK economists have taken this point too far as they presume residual saving of one sector must be present for another sector's financing. Keynes's views in the *Treatise* provide the missing piece, showing how changing views about the future can have a disparate effect on balance sheets, causing a net increase or decrease in net worth across all sectors. The stylized facts discussed in Chapters 2 and 3-- where the net household saving ratio has diminished although wealth ratios and the supply of credit continued to rise-- are

better explained by this missing view. Over the expansion, flows of saving have diminished as both borrowers and lenders become more optimistic and lower their margins of safety (Minsky, 1986). As demonstrated in Chapter 3, net household saving has grown only during business cycle contractions, making the intersectoral transfer of funds from households to firms the sole source of funds, as implied by the New Keynesian model, questionable.[65] Firms continue to find funding even as intersectoral flows of household saving have stagnated. The expectation of windfall profits from within the business sector can itself provide for a form of intrasectoral firm finance.[66] However, incorporating the margin from early market confidence into both models and balance sheets to capture their change is not an easy task.

Part of the trouble stems from *ex post* accounting where an asset on one party's balance sheet is another's liability. The treatment of private debt in the recent debate between Paul Krugman and Steve Keen demonstrates two views on its addition to effective demand and the relationship between aggregate income and expenditure. Keen's revolutionary though controversial position posits that aggregate demand is equal to last period's income plus the change in private debt. Krugman questions redefining the income-expenditure identity and downplays the importance of rising private debt. Using

[65] Though unaddressed in this chapter, foreign saving and government dissaving clearly play a significant role in U.S. financial conditions; however, nonfinancial intrasectoral flows within the firm sector itself provide finance (Bellofiore & Vertova, 2014). The productive sector can finance itself through its own retained earnings while also directing its saving into financial channels such as other firms' securities.[65] Recent financialization literature reveals that firm returns are increasingly from financial sources (Krippner 2005; Palley 2007). To meet its own short-term needs while maintaining its internal reserves, the productive sector has become overcapitalized, holding financial liabilities in excess of those needed to undertake productive investment (Toporowski, 2010). Through its own saving, the firm sector has managed to self-finance, though new investment expenditure alone has not been the destination of retained earnings or firm borrowing.

[66] Clearly, equity issuance and borrowing prove insufficient as the sole explanation for firm investment. Rising asset prices, equities included, have not led to growth in net stock issuance, the annual issue of stocks against firm repurchases, since the 1980s. Instead, the merger and stock repurchase waves of the 1990s have driven the net stock issuance ratio downward. In response to asset inflation, firms are repurchasing their own issues and those of other firms in excess of new issues (Treeck, 2009).

the logic that one sector's liability is merely another's asset, Krugman is able to disregard growth in the level of private debt. Lending is viewed as the transfer of purchasing power rather than the creation of credit.

This chapter adds to that conversation by incorporating Keynes's theory of speculative states within the financial cycle from his *Treatise* (1930). Positive financial prospects as shown in the asset prices and firm profitability are important to market participants for multiple reasons. For one, the inflated asset prices and expectations of continued growth are a form of collateral, making borrowing agents' balance sheets appear more robust. The raised value of collateral increases lender willingness to supply funds (Bernanke et al., 1999). Raised wealth ratios act to increase both lender willingness and speculative demand to purchase and hold financial securities. Financial and lending institutions, rather than passively transferring purchase power, are active in their response to asset price movement. Even the expectation of favorable returns creates a positive margin against which firms can borrow or issue securities.

We have suggested that this margin or form of expectation capital be termed intangible, in contrast to the easily distinguished machinery, plant, and tools. Firm assets are composed of both tangible and intangible sources ($K_f(1 + \pi^e)$). The expectation of firm profits and asset revaluation alters the composition of balance sheets as agents anticipate firm profits or simply capital gains on assets. Firms may also increase the use of equity finance or hold even more of other firms' securities.[67] In essence, firms are using their own earnings for financial accumulation and an intrasectoral form of finance (Krippner, 2005; Mitchell & Toporowski, 2014).

[67] Toporowski (2009) highlights equity inflation and this form of finance growing in the late 1970s.

As expectations alter and the boom ends, this behavior quickly reverses, and the economy moves from being debt fueled to debt burdened. Keynes's 'bear position' begins to takes hold, though asset prices and firm profits may continue to rise. In the second phase of the Keynesian credit cycle, an equities expansion becomes a liability. In addition, growth in the level of debt and credit markets has a positive feedback upon asset prices, further adding to or reducing wealth, as discussed in Chapter 3. For example, an increased return to equities and positive financial sentiment lowers household preference for liquidity, which leads to a reduction in the quantity of deposits but an increase in that of equities. The shift away from liquid assets further inflates existing values, amplifying the credit-asset price link. Even before the realization of capital gains, positive views about the future generate a forward financial momentum with far-reaching real effects.

Rising firm profitability can meet many of its own expenditure needs so long as it is able to sell its future returns. The trouble is that many macroeconomic models and methods of accounting fail to capture the immediate changes occurring to balance sheets as asset prices and financial expectations change. Rather than the simple redistribution of purchasing power between debtors and creditors, the level and growth of private debt has macroeconomic effects through its influence upon asset prices and resultant feedback to credit. In addition, traditional balance sheets are unable to capture the growth or disappearance of intangible capital or profit expectations for the producing firm. At each stage of the business cycle, profit expectations turn. It is the change in expectations that goes unseen on the firm's books, though they strongly influence the firm's spending behavior and its relationship to its creditors. However, each sector's financial stance, if more reliant upon asset valuation, may also be more susceptible to financial crisis.

Table 4.1: Accounting for Patient and Impatient Sectors

	Patient	Impatient	∑
Risk free bond	$+B_p$	$-B_{imp}$	0
Net Worth	$-NW_p$	$-NW_{imp}$	0
∑	0	0	0
Consumption	$-\Delta C$	$+\Delta C$	0

Table 4.2: Balance Sheet: Three-Sector Closed Economy

	Households	Firms (nonfinancial)	Banks (financial)	∑
Tangible Capital		$+K_f$		K
Deposits	$+M_h$		$-M$	0
Loans		$-L_f$	L	0
Equities	$+E_f$	$-E_f$		0
Net Worth	$-NW_h$	$-NW_f$	$\overline{-NW_b}$	0
∑	0	0	0	0

Table 4.3: Balance Sheet: Early Expansion With Positive Profit Expectations

	Households	Firms (nonfinancial)	Banks (financial)	∑
Tangible Capital	$+K_h$	$+K_f(1+\pi^e)$		K
Deposits	$+M_h$	$+M_f$	$-M$	0
Loans	$-L_h$	$-L_f$	L	0
Equities	$+E_f$	$-E_f$		0
Net Worth	$-NW_h$	$-NW_f(1+\pi^e)$	$-NW_b$	0
∑	0	0	0	0
Accounting Memo:				
Early expansion or Keynes's Bull Market with consensus of opinion	$(\Delta F\pi^e{}_{(+1)} - \Delta p * e_f) > 0$	$\uparrow \Delta F\pi^e$ *allows* $\uparrow L_f$		
Late expansion or Keynes's Bull Market with consensus of opinion	$(\Delta F\pi^e - \Delta p * e_f) < 0$	$\downarrow \Delta F\pi^e$ *reduces willingness to* $\uparrow L_f$		

Table 4.4: Balance Sheet: Early Expansion and Discounting

	Households	Firms (nonfinancial)	Banks (financial)	∑
Tangible Capital	$+K_h$	$+K_f(1+\pi^e)$		K
Commercial Paper		$-CP$	$+CP$	0
		$+CP$	$-CP$	0
Net Worth	$-NW_h$	$-NW_f(1+\pi^e)$	$-NW_b$	0
∑	0	0	0	0

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